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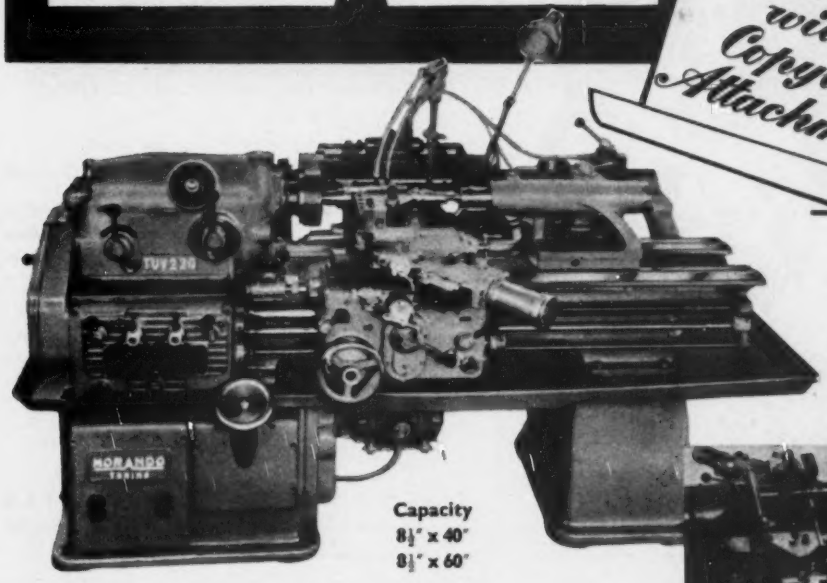


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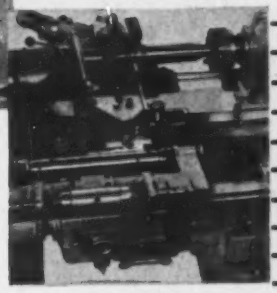

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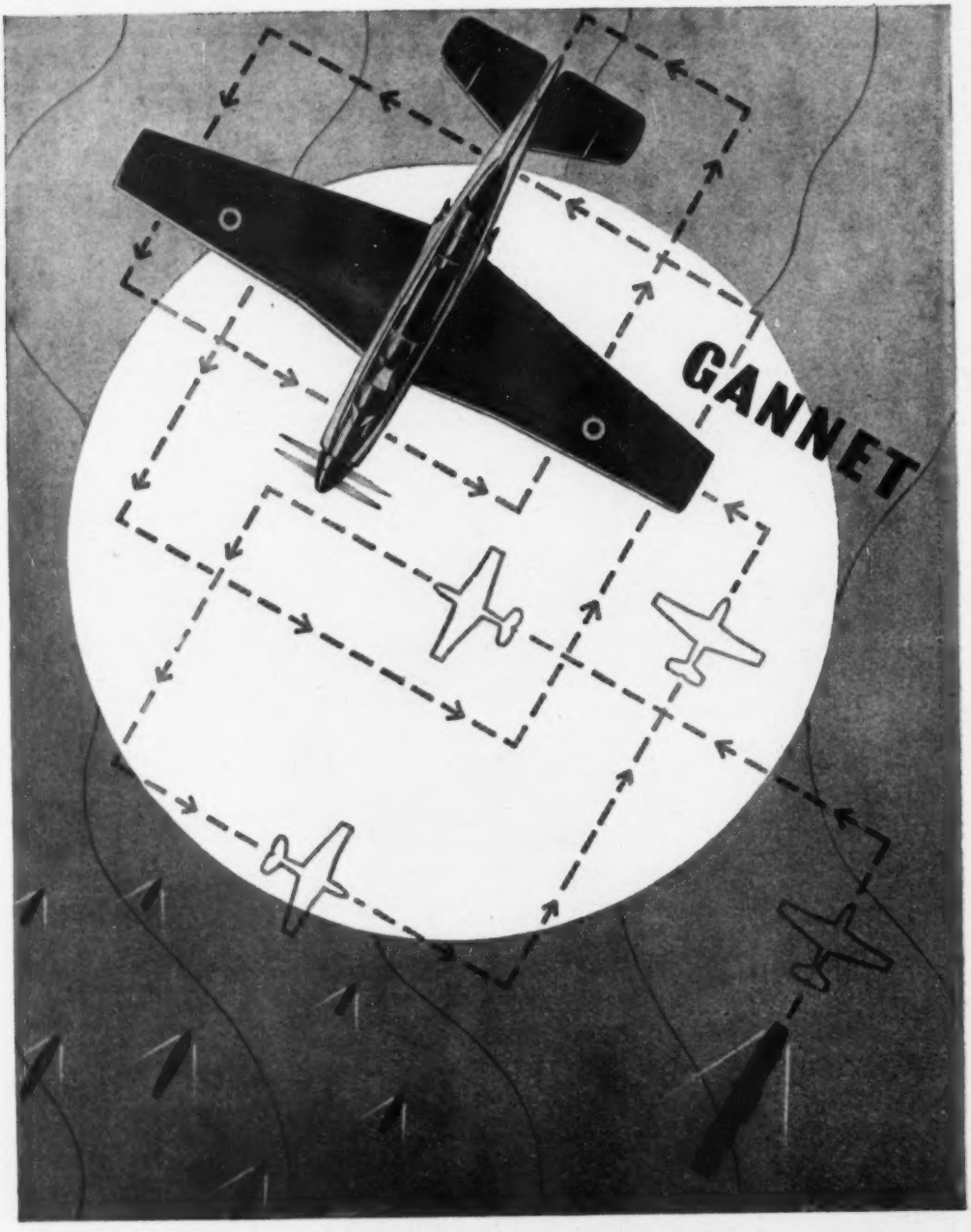


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## A Supercharged Turbojet

IN this issue our readers are introduced to the Bristol Olympus, a new turbojet which commands attention not only by the excellence of its performance in terms of thrust and economy (even on the basis of the conservative figures officially disclosed) but by reason of its unusual technical characteristics. It consists essentially of a low-pressure and a high-pressure unit, each having an entirely independent axial compressor and turbine, the low-pressure unit acting as a supercharger to the high-pressure compressor.

The Olympus cannot claim to be the first dual-compressor engine, for the now extinct Rolls-Royce Clyde and the far-from-extinct Dart turboprops are both examples of a basically similar layout, while the pure-jet Pratt and Whitney J-57, which works on the same principle, is already flying in the Boeing YB-52 and Convair YB-60 bombers. But we concur in the maker's belief that in no other country to-day is there so powerful or so economical a turbojet at a comparable stage of development.

Necessarily more complicated—and consequently, it is presumed, more expensive in initial cost—than the general run of turbojets, the Olympus will have to be very carefully matched to its airframes in order that its benefits may be fully realized. Obviously, it will find its supreme application in large, fast, long-range, high-altitude aircraft—primarily bombers, but also (we may hope for the years to come) transports. Naturally, conjecture is rife, and one observer gives it as his understanding that four Olympus will be used in a new bomber for the R.A.F., to have a range exceeding 6,000 miles at 600 m.p.h. Certainly this is not an unreasonable "understanding" and it would hardly be surprising, moreover, if long-range heavy fighters—a Gloster G.A.5 development, for example—were to take advantage of the economy in fuel consumption and the high thrust at altitude offered by the new engine.

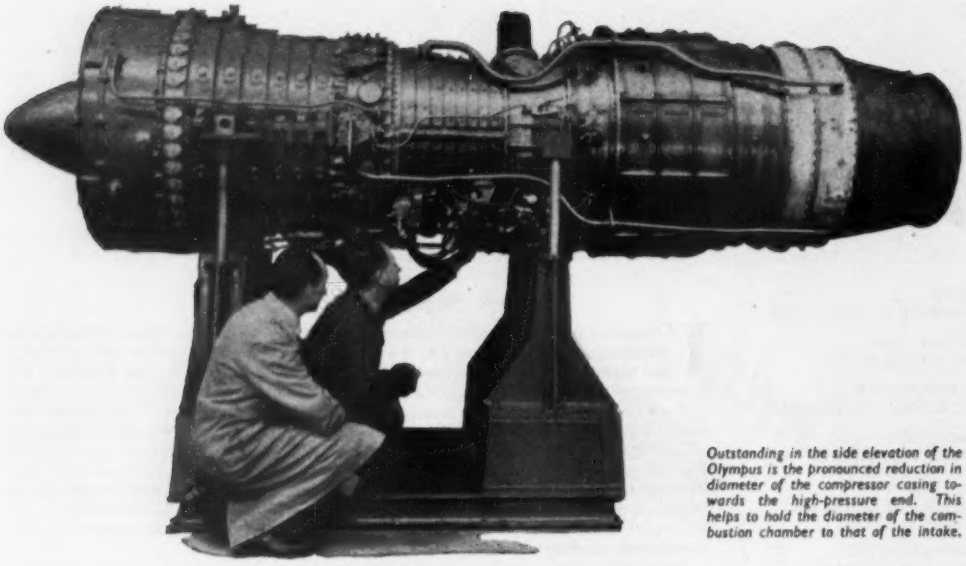
Hitherto the Olympus has been known only as a name—and a fitting one indeed for such a magnificent piece of engineering; but now it is seen as a mighty new buttress of Britain's soaring reputation in the air. Can we doubt that the airframes chosen to receive it will be worthy?

## Helicopter Groundwork

AT last there is a growing awareness of the importance of the helicopter, and each day brings fresh ideas as to its eventual place in the air-transport picture. As yet the prospect is uncertain, but, as we have reported elsewhere in this issue, the B.E.A. specification for a twin-engined, passenger-carrying helicopter has already encouraged a great deal of valuable study. More recently, Silver City Airways have declared their intention of exploiting the abilities of the helicopter as a freight-carrier, and their ambitious proposals have been pronounced feasible by at least two manufacturers. The twin-engined helicopter should prove to be more adaptable than fixed-wing airliners of comparable power, and the Silver City "flying crane" is, in fact, intended to employ the primary components of the "Beabus" type of helicopter now under development.

We have frequently championed the cause of the helicopter, and that our enthusiasm is by no means isolated is proved by questions recently asked in Parliament about the degree of progress made in developing this class of machine. Mr. Lennox-Boyd, who replied, thought there was nothing to be ashamed of in our development progress, and he rightly pointed out such achievements as the Bristol 173, the running of scheduled passenger services and experience in helicopter blind-flying. It was less encouraging, however, to learn that there are a mere 25 helicopters on the U.K. register, of which only 11 are operational—especially when it is remembered that Service helicopters are almost equally rare. Neither was there satisfaction in Mr. Lennox-Boyd's assurance that it "might be possible" to use converted railway termini as airstops or helicopter stations, but that practical planning must await more data on the characteristics of twin-engined helicopters.

City airstops will certainly be required before many years have passed, and although it is perhaps too early to lay concrete, the time is surely ripe for a more positive approach to the problem of ground facilities.



*Outstanding in the side elevation of the Olympus is the pronounced reduction in diameter of the compressor casing towards the high-pressure end. This helps to hold the diameter of the combustion chamber to that of the intake.*

# OLYMPUS

## *Unrivalled Economy from a Fundamentally New Turbojet*

FOR many months, booming columns of efflux gas rising from the rear of the Bristol Aeroplane Company's turbojet test-bed building (described in *Flight* of May 9th, 1952) have borne testimony to the power of the big turbojet that the company has under development.

That this engine is the Bristol Olympus is not news; but only now can preliminary details of this impressive unit be made public. The Olympus (even the name suggests power) is not the first Bristol turbojet, for it was preceded by a pure-jet version of the original Proteus turboprop known as the Phoebus. But the Olympus is an entirely new design and rarely has a new engine shown so clear an advance on all that has gone before.

The Olympus has been developed primarily for large, long-range aircraft, for which installations long life and low fuel consumption are of major importance. With these thoughts in mind, the design staff of the Bristol Aeroplane Company's Engine Division, guided by Dr. S. G. Hooker, O.B.E., B.Sc., D.Phil., F.R.Ae.S., F.R.S.A., began to prepare a turbojet at once more powerful and more efficient than any other in the world.

Basic thermodynamics can show that, for the gas turbine just as much as for the reciprocating engine, one of the most fruitful sources of increased thermal efficiency is an increase in the pre-combustion compression ratio. But—again for both types of prime-mover—increased pressure-ratio cannot be obtained without overcoming attendant difficulties. In the case of the piston engine, the principal trouble is usually detonation. In the turbojet, the greatest difficulty is in the attainment of easy starting and efficient slow-running.

One of the aims of the axial-compressor designer is the maintenance of an essentially uniform flow-velocity (about 500 ft/sec) through all stages of compression. His blade design is largely based upon this assumption, and to this end he will so design the compressor that the flow cross-section area will decrease in direct proportion to the pressure increase. For example, a compressor designed for a 9 : 1 pressure-ratio will have an outlet area roughly one-seventh of that of the primary intake, the two ratios being dissimilar as a function of the temperature-rise across the compressor.

**BRISTOL OLYMPUS**

| | |
|---|---|
| Diameter | 40in |
| Length from intake flange | 124in |
| Weight | 3,520 lb |
| Maximum thrust | 9,750 lb |
| Specific consumption | 0.766 lb/lb/hr |

Characteristic of the earliest Olympus types 8.01 1 and 2, this table nevertheless includes some impressive figures. It may be pointed out that the thrust quoted is not typical of the engine today and a higher rating is "confidently anticipated."

At low rotational speeds the pressure-ratio of such a compressor will be less than 2 : 1 and the reduction in cross-section area in the later stages will seriously restrict the airflow and greatly reduce axial velocity in the initial stages of compression. This will cause the first rows of blades to stall, further impeding delivery and causing, as secondary effects, poor acceleration and severe overheating at the turbine. Characteristic of the high-compression turbojet is, therefore, a low efficiency at starting, with poor acceleration and the possibility of turbine-blade failure as additional disadvantages.

For the Olympus, the Bristol designers decided to choose a compression-ratio higher than ever previously attempted on an aircraft gas turbine; but they were fully aware of the difficulty which this would entail. A two-stage system was, therefore, developed, similar to previous layouts in having distinct high- and low-pressure compressors, but novel in that each compressor is driven by its own turbine, the two units being mechanically independent.

When the Olympus is started the starter motor probably drives the H.P. compressor only. This compressor turbine unit then accelerates rapidly, while the gas flow through the turbines accelerates the L.P. system more gradually in order to preserve an efficient flow through the compressor at all rotational speeds.

The correctness of the decision to employ such a layout—known colloquially at Bristol as a "two-spool" arrangement—is demonstrated in several ways. The specific fuel con-

sumption of even the earliest types of Olympus is, at 0.766 lb/lb thrust/hr, far lower than that of any other turbojet so far announced; not one turbine-blade failure has occurred in the not inconsiderable period of Olympus development-running; running stresses have been kept unusually low; and—welcome news to the future Olympus-pilots—response to altered power settings is so immediate as to be almost unbelievable to anyone brought up on single-shaft turbojets. But, before discussing the performance of the Olympus, it will be as well to examine the officially-released photographs of the engine.

Starting at the front, the size of the intake orifice underlines the enormous air flow passing through so powerful a turbojet, while the progressive reduction in the compressor-casing diameter shows the sort of compression ratio achieved. Many previous engines have maintained a uniform case-diameter, the flow cross-section being diminished by increasing the diameter of the compressor drum. In the Olympus the drum is probably at minimum diameter throughout, the resultant necking of the casing providing space for accessories and helping to reduce the diameter of the combustion chamber, or chambers.

The casing over each compressor stage is seen to be cast in two halves—top and bottom—bolted together and then bolted to the intermediate casing. Around the first stage of the L.P. compressor can be seen an interesting ring of bright discs.

There appear to be six or seven L.P. stages and eight H.P. stages. This total of 14 or 15 stages compares with the nine of the Avon and the 13 of the Sapphire. The compressors are separated by an intermediate casing into which, or from which, several pipes can be seen leading. A large-diameter pipe runs from the second H.P. stage to what may be the second turbine—no doubt for cooling and bearing-pressurization.

The compressor delivery is led through a diffuser about a foot long and into the combustion chamber, which appears to be of the annular type, fabricated from spot-welded sheet metal. Ten burners can be seen around the engine periphery, each supplied by main and pilot fuel pipes. Aft of the combustion area can be seen a turbine section in which—although there appear to be more—there are probably but two turbines, the forward turbine driving the H.P. compressor and the rear turbine driving the L.P. unit.

Altogether, the Olympus appears to be an excellent piece of engineering, fully in accordance with the standard set by so many previous engines from the same source. It has its disadvantages, among which may be named a slight increase in complexity and in the number of bearings required; but what small prices are these for the performance and controllability which this Bristol "two-spool" arrangement offers.

The writer was recently afforded an opportunity of handling an early Olympus mounted in the Bristol test-bed building previously mentioned. It was indeed an interesting experience, becoming the more impressive as the implications of the behaviour of the engine were gradually appreciated.

The engine was started with unusual ease, without any irregularity in the readings of pressure and temperature recorders. Tailpipe temperature was commendably low and steady. At idling power, the difference in speed between the high- and low-pressure compressors was marked—as would be necessary for efficient compression—but the low-pressure system accelerated rapidly as the power lever was advanced, bringing the two rotating parts of the Olympus more nearly into phase.

Hydraulic engine control is a feature of the Bristol turbojet test-bed building, and it affords excellent government of the unit under test, without backlash. A further additional feature is the provision of automatic recording cameras for all engine instruments, and tribute should also be paid to the most efficacious Muffelite (Cementation) sound-proofing.

Not only does the Olympus provide greater static thrust than any other turbojet at a comparable stage of development but, to our knowledge, no other turbojet can run at so low an idling thrust. The precise figure obtained may not be given, but it should be theoretically possible to push back an idling unit of this type with one hand, this result being facilitated by by-passing much of the fuel from the burners. From this condition of running, full power can be attained in very, very few seconds.

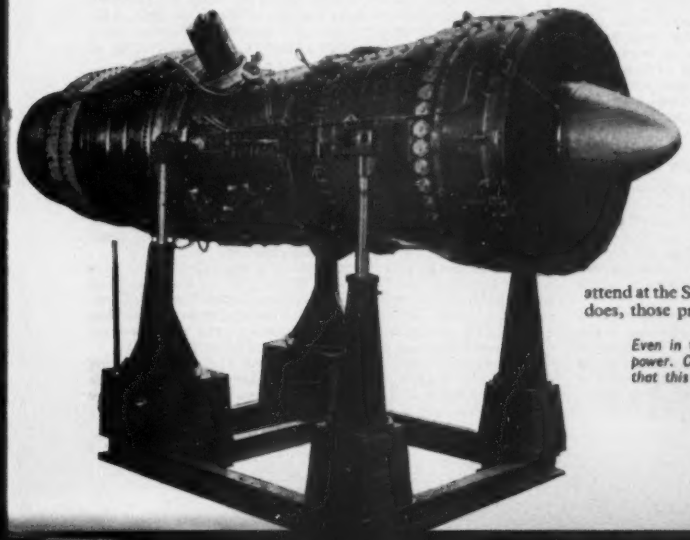
In fact, when some 2,000 lb thrust has been reached the power lever can be handled in the same way as can that of a reciprocating engine. If we had not known the integrity of all at Bristol, we would have looked for a mechanical linkage between the power lever and the thrust-meter. The rotational acceleration of the engine is nothing short of incredible, while the rate at which the operator can "pour on the coals" is unexcelled by aircraft piston engines. No longer, it would appear, will the turbojet pilot be committed to a landing throughout so much of his approach.

Regarding the installations in which the Olympus will appear, it may be mentioned that the Bristol designers did their utmost to provide an engine with a sensibly uniform overall diameter throughout its length. At very high speeds —M.1.4, say—frontal area becomes by far the dominant dimension of any airborne body. In the Olympus, frontal area has been kept to a minimum (some 8.5 sq ft) for several reasons.

In the United States, "pods" are clearly the favoured method of installing turbojets in large aircraft. Without doubt such installations are accessible and provide an efficient ram entry and short tailpipe. But, in this country at least, it is felt that buried engines are essential for the fastest large aircraft, in spite of the attendant problems of accessory distribution and providing large holes in the wing spars.

It is no accident that the Olympus is so eminently suited to such buried installation. It may not be very long before new airframes are provided capable of utilizing the full potential of the engine. In fact, this may occur on both sides of the Atlantic, the Wright Aeronautical Corporation having secured a licence to build the Olympus in the U.S.A. This agreement, which was announced on October 19th, 1950, provides for a mutual exchange of information between the two companies concerned and, although the flow of knowledge has so far been westwards, American production "know-how" may later be of very great value to the Engine Division in Bristol.

In the meantime, development of this most important engine is being carried forward with all speed. Two Olympus are being prepared for flight in a Canberra test-bed and it is likely that this aircraft will be able to attend at the S.B.A.C. flying display in seven weeks' time. If it does, those present should see an impressive demonstration.



*Even in the shop the Olympus appears the very apotheosis of power. Only the starter breaks the neat outline, and it is certain that this accessory will be re-positioned before the production Olympus appears.*

# FROM ALL QUARTERS

## "Bill" Saves the Records

THE week's good show was put up by Gloster's chief test pilot, S/L. W. A. ("Bill") Waterton, A.F.C. and Bar, whose exploit involved the first prototype Gloster G.A.5 delta-wing multi-purpose fighter, as now on order for R.A.F. re-equipment.

After a test flight from Boscombe Down on Sunday, June 29th, the G.A.5 developed trouble with a new elevator control and Waterton decided that, rather than bale out, he would set the machine down on the main runway. In this undertaking the undercarriage was wrecked. The big fighter skidded along on its belly, slewed round and caught fire. Waterton grabbed the cinefilm from the automatic observer and leaped clear—not, however, without sustaining slight burns. Fire crews quenched the flames before the G.A.5 was totally consumed.

Interviewed after the incident, Waterton paid tribute to the delta construction in saving the machine from greater damage during the landing. He is further quoted as saying: "I was not doing any special manœuvres; they had been completed. I was just using the wonderful weather and testing some new elevator controls. However, there will soon be another G.A.5 in the air. It is a super-priority production job for us and this bad luck will only stimulate us that much more."

## Award to Brigadier-General Lewin

THE Committee of the Royal Aero Club has awarded Brig.-Gen. Arthur Corie Lewin, C.B., C.M.G., D.S.O., a Bronze Medal of the Royal Aero Club for his outstanding record of private flying over a number of years.

Brig.-Gen. Lewin was born on July 26th, 1874, and learned to fly in 1931, obtaining his pilot's licence at the age of 57. He flew solo to Kenya in 1931 and back again in 1932. Between 1935 and 1937 he flew to and from Kenya by various routes. On one occasion, it will be remembered, he force-landed in the Sudan swamps, where he remained for ten days. During the war he flew as a sub-area commander and, later, as welfare officer, with Royal Air Force East African Command. He has owned ten aeroplanes and flown over 2,300 hours as a private pilot. Since 1935 he has taken part in six air races, three of which he won, and he was second in the King's Cup Air Race in 1937. This year, at the age of 77, he won the East Africa Aerial Derby.

The medal was presented to Mrs. Lewin, in the absence of her husband, by Mr. Whitney Straight, on June 25th.

## G.A.P.A.N. Awards

FOR further outstanding work in air navigation, and in particular for his pioneer work in opening up the direct Australia-South America route, Capt. P. G. Taylor of Trans-Oceanic Airways has been awarded the Johnson Trophy for the second year in succession by the Guild of Air Pilots and Air Navigators.

The Guild's Cumberbatch Trophy for the same period (1950-51) has been awarded to Tasman Empire Airways for their record of safety and regularity in operating passenger, freight and mail services, in particular on the Auckland-Sydney, Wellington-Sydney and Auckland-Fiji routes. Over the past 11 years, T.E.A. has operated without any major accident and without injury to any passenger or crew-member, and has maintained 96-100 per cent regularity on the routes named.

W/C. Barry T. Aikman, chairman of Aquila Airways, receives the Brackley Trophy for pioneer work in the development and operation of an aerial public-transport service using flying-boats. The Guild states that a considerable contribution has been made to the organization and improvement of operation of these craft by his "enterprise in launching scheduled flying-boat services in these difficult years . . . when many major operators have discarded the use of these vehicles, despite their high popularity with many experienced air travellers."

## Hunting Aerosurveys' Laboratories

INTRODUCING Mr. Reginald Maudling, M.P., Parliamentary Secretary to the M.C.A., who opened the new aerial-survey laboratories of Hunting Aerosurveys, Ltd. at Boreham Wood on June 27th, Mr. C. P. M. Hunting welcomed him not only in his official capacity but also as the M.P. in whose constituency the new laboratories stood. Mr. Hunting also reminded those present that the company had done work in almost every country in the world, except those behind the Iron Curtain.

In his address Mr. Maudling said, "The work being done by a private-enterprise organization such as the Hunting aerial survey group of companies all over the world is of immense importance to this country at the moment. Not only is it bringing in foreign exchange, but it is opening up the undeveloped areas of the world and uncovering hidden resources of timber, oil, minerals, water and metals—and so bringing us those essential raw materials that we must have to develop our standards of living."

Mr. Wills, managing director, told Mr. Maudling that the company had started in 1919 and had made an important contribution to the war effort during 1939-45.

## Jet Aid from France

BRITISH Commonwealth sales of the S.N.C.A.S.O. "booster power-unit" (consisting of a Turboméca Palas turbojet housed in a practically self-contained Fouga-designed nacelle) are to be handled by Aerocontacts, Ltd., who recently obtained a similar concession for the S.O.30 Bretagne airliner. Producing 350 lb static thrust on fuel from the main aircraft supply, the Palas is put forward as a useful method of improving the performance of twin-engined airliners, in compliance with I.C.A.O. requirements.

The following advantages are claimed for an aircraft equipped with one, or two, of these units, which weigh 210 lb and measure 5ft 3in long by 17.7in in diameter; greater safety if one [piston] engine fails on take-off; increased service ceiling on one engine; increased range; increased payload [1,000 lb in the case of the Dakota with one Palas]; ability to use smaller airfields and those at higher altitude or temperature. The sound of the jet is stated to be inaudible above the noise of the main engines. Maintenance, it is claimed, is practically negligible, since the Palas would normally be used for about 50 hours on an aircraft flying 1,500 hours in a year, and the life of the jet unit is around 500 hours.

S.N.C.A.S.O. have conducted some interesting tests on a DC-3 equipped with a Palas beneath the fuselage, and it is hoped to publish some of the results in the near future.

## Busy at Hamble

THE history of Air Service Training, Ltd., which appeared in our issue for June 20th, touched but lightly upon the company's Aircraft Division, the 21st anniversary being applicable to the Training Division only. But the manufacturing side of A.S.T. is now preparing to taper off Meteor production and replace this with new undertakings.

The Hawker Hunter will soon occupy a major place in the A.S.T. production picture, and the jig and tool departments are now tooling up for component manufacture for this fighter. A still newer commitment is the establishment of a G.A.5 shop, in which prototype components have been made; no doubt full-scale production will follow. Finally, it will be recalled that A.S.T. have built up a reputation as manufacturers of test-bed aircraft—with, for example, the Sapphire-Meteor and the Saab-axial-turbojet Lincoln. The newest such conversion is a twin-Atar Meteor, which has been prepared for the French S.N.E.C.M.A. group. The Atar is a large axial-flow turbojet of some 7,000 lb static thrust.

A recent visitor to A.S.T.—on June 23rd—was Marshal of the Royal Air Force Viscount Trenchard, who inspected all departments of both the company's divisions and took tea in the students' mess. It is appropriate to recall that A.S.T.'s managing director, G/C. R. J. F. Barton, O.B.E., served under Lord Trenchard in the Royal Fusiliers and again in 1914 at the Central Flying School.

## Mr. Frederick Mew

IT is with regret that we have to record the death on June 18th of Mr. Frederick Mew, sales manager of Desoutter Bros., Ltd. Having spent over twenty years with Beardmore Motors, Ltd., Mr. Mew joined the Desoutter company in January, 1939, as assistant sales manager.

## NATO Air Display

THE first annual air "demonstration" of the North Atlantic Treaty Organization is to be held in Belgium this month. Of the signatory nations (in addition to Belgium as host), Britain Canada, France, Holland and the U.S.A. have all promised full support, and smaller contingents are expected from Italy, Denmark, Norway, Luxembourg, and Portugal. The three-day programme will include drill, colour guards, track and field contests, and will conclude with a spectacular air display and a grand fly-past by the air forces of the Treaty nations.

The demonstration is the outcome of a suggestion by Lt.-Gen. Lucien Leboutte, Chief of Staff of the Belgian Air Force, and met with the immediate approval of Lt.-Gen. Lauris Norstad, Commander-in-Chief, Allied Air Forces, Central Europe. More than 1,500 NATO airmen will travel to Brussels for the various events, quite apart from those who will participate in the fly-past.

The ceremonies will begin on Friday, July 11th, with the laying of a wreath on the tomb of the Belgian Unknown Soldier. On this occasion the chiefs of NATO delegations and the Belgian Minister

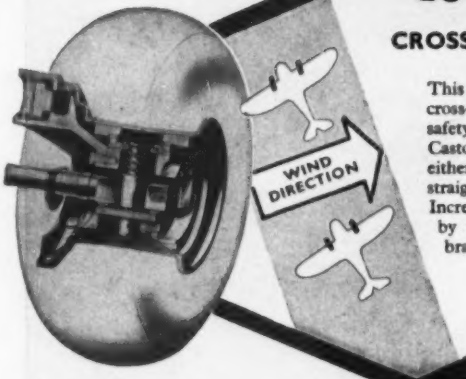
P N THE A
The Hawker "Hunter"
Interceptor Fighter
powered by the
Rolls-Royce "Avon"
turbo-jet engine.
ROLLS-ROYCE

# SAFETY ON TOUCHDOWN

## GOODYEAR

### AIRCRAFT TYRES

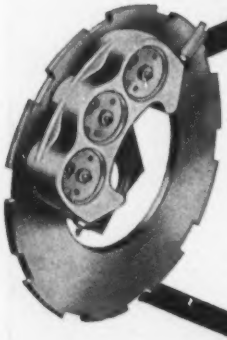
Developed through years of research and testing, Goodyear aircraft tyres are built to "take it" on touchdown. Resistant to heat, fatigue and bruising, built to stand up to the impact of weight multiplied by m.p.h., they assure safety at today's high landing speeds. The All-Weather Tread illustrated is one of the variety of aircraft tyres, designed to give maximum reliability under all conditions.




## GOODYEAR

### CROSS WIND LANDING GEAR

This patented Goodyear device permits cross-wind landings or take-offs in relative safety, without any tendency to ground loop. Castoring wheels permit a yaw of 25° on either side of centre while maintaining a straight course along the runway.
Increased flying safety is further enhanced by the incorporation of the popular disc brake in this revolutionary castoring wheel.



## GOODYEAR

### ORIGINAL DISC BRAKES

The Disc Brake was first introduced by Goodyear several years ago. Since then the knowledge gained from actual operating experience has been vigorously applied, and to-day, the Goodyear Disc Brake has a reliability unique in this field. They give the pilot real confidence in landing, and sensitive control in every ground manoeuvre. Here again, Goodyear Research and Enterprise are far in the lead.

YOU CAN TRUST
GOODYEAR
AVIATION PRODUCTS
FOR UTMOST RELIABILITY

THE GOODYEAR TYRE AND RUBBER COMPANY (GREAT BRITAIN) LIMITED WOLVERHAMPTON

## FROM ALL QUARTERS . . .

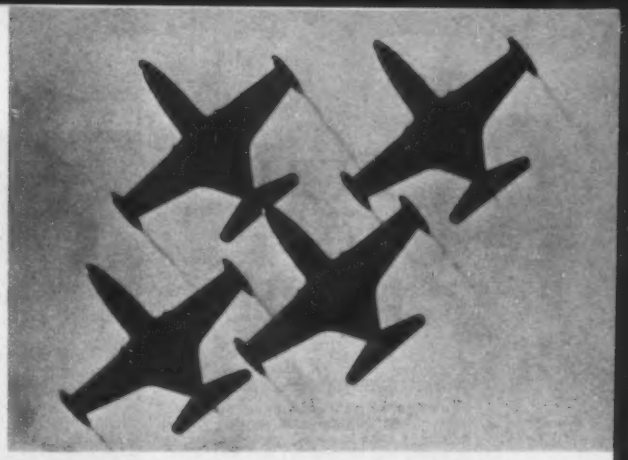
of Defence will attend. In the evening, in the Grand Place at Brussels, the national drill teams will perform, with their own military bands providing the musical accompaniment. On Saturday there will be a static display, specially designed to interest the schoolchildren, and, after preliminary eliminations in track and field contests at Heysel stadium, the finals of these events will be staged on the Saturday night.

On the afternoon of Sunday, July 13th, more than 150,000 people are expected at Melsbroek Airport for the culminating air display. King Baudouin will arrive by air to open the proceedings and a four-hour flying programme is planned, with three U.S.A.F B-36 bombers joining in the fly-past. British participation will include a fly-past by a squadron of Canberra jet bombers and a display of jet fighter aerobatics by aircraft of the 2nd Tactical Air Force.

### "Daily Express" Race Entries

THE Royal Aero Club has now announced entries for the *Daily Express* Challenge Trophy Air Race, which is to be flown over the usual South Coast course on Saturday, August 2nd. Competing aircraft total 49. Names of the pilots and their machines are as follows:—

H. M. Kendall (Chilton D.W.1); H. Best-Devereux (Taylorcraft Plus D); C. Gregory (Taylorcraft Plus D); D. G. S. Cotter (Taylorcraft Plus D); I. A. Forbes (Tipsy Trainer); P. B. Cash (Auster Autocrat); D. R. Robertson (D.H. Moth Minor); G. A. Farley (Auster Autocar); T. W. Hayhow (Auster Trainer); E. W. Westbrook (Miles Messenger IVa); Geoffrey Marler (Miles Falcon Six); B. J. Snook (D.H. Tiger Moth); W. P. Bowles (Miles Messenger IIa); Capt. J. H. Christie (D.H. Leopard Moth); D. D. Stiff (Miles Hawk Trainer); Mrs. Y. M. Grace (Taylorcraft Plus D); H. Blumenthal (Miles Hawk Major); R. S. Spackman (D.H. Moth Minor); Miss E. L. Curtis (Foster Wicko G.M. 1); J. K. Quill (Taylorcraft Plus D); W. P. I. Fillingham (D.H. Moth Minor Coupé); C. G. Alington or D. Ogilvy (Comper Swift); N. A. Harper (Taylorcraft Plus D); R. E. Clear (Comper Swift); A. Cdre. Guy Adnams (Percival Proctor III); L. C. Marmol (Percival Proctor I); Capt. S. F. Bissmarck (Saab Safir); S/L. D. White (Percival Proctor V); D. R. S. Bader (Percival Gull); F/O. M. R. T. Chandler (Miles Hawk Trainer IIIa); H. J. G. Turner (Percival Proctor III); W/C. R. H. McIntosh (Percival Proctor I); A. S. K. Paine (Percival Proctor I); Mrs. Z. Irwin (Percival Proctor V); D. J. Bennett (Percival Proctor V); H. Wood (Percival Proctor V); W. W. Lyle (Percival Proctor I); F. C. Muir (Miles Mercury VI); H.R.H. Prince Alexander of Yugoslavia (Miles Gemini IIIb); W/C. P. Richey (Percival Proctor I); J. P. Crowther (Percival Proctor III); Vico Rossapina (Ambrosini-Rondone F.4); S/L. W. I. Lashbrook (Percival Proctor III); J. N. Somers (Miles Gemini III); G. A. Ferrari (S.A.I. Ambrosini S.7); W/C. C. M. Grece (Miles Nighthawk); F. Dunkerley (Miles Gemini Ia); S/L. J. Rush (Miles Falcon Six); R. R. Paine (Miles Hawk Speed Six).



*BLUE ANGELS: Grumman F9F Panthers of the newly reactivated Blue Angels Squadron of the U.S. Navy show their paces. The Squadron was disbanded at the start of the Korean conflict but is once more in fighting trim, as can be credited on the above evidence.*

# FLYING THE ORENDA-SABRE

RARELY is it possible to print a first-hand account of flying in a really modern fighter; so from the new Avro Canada house journal *Jet Age* we have abstracted this description by Michael Cooper-Slipper, D.F.C., Avro Canada test pilot, of his trip from Toronto to Montreal in 28 minutes—at an average speed of 665 m.p.h. The flight took place a year or so ago, but the interest of the story is not lessened.

The purpose of the trip was to ferry the Orenda-Sabre test-bed to Montreal for an airframe overhaul, since the Canadair plant there had the necessary jigs. At the same time, it was decided to make a speed run for test purposes. The previous best time had been put up a year before by S/L. W. A. Waterton, who flew an Avro Canada CF-100 at an average speed of 638 m.p.h.

"Mike" Cooper-Slipper writes: "The Sabre aircraft and the Orenda engine were going to be given quite a beating in the next few minutes and I was excited with the prospects. My calculations had shown it was theoretically possible with the faster Orenda-Sabre to beat Bill Waterton's speed in still air at almost any altitude. I had decided, for fuel economy, to fly as high as possible and still maintain a high air speed without running into Mach number difficulties. . . . Met. had given a favourable weather forecast, but they didn't promise much help from the wind.

"Taped in front of me as I sat in the instrument-packed cockpit of the Sabre was a chart I had prepared to tell me at a glance what indicated air speed I should require at any altitude, assuming there was no wind. I had also worked out a series of times over various check points that would tell me my ground speed without having to do any calculations during the flight. I knew I'd have my hands full without that too.

"Making a wide sweep over Hamilton, I passed over Malton tower at 37,000ft. I took a time check and began a slow descent at 1,000ft a minute, leaving the Orenda at full power. Going downhill like this, my speed built up until I suddenly felt a shudder run through the aircraft. I was getting close to the speed of sound.

"Realizing that my Mach number was too high and was going to make a mess of my calculations, I throttled back a little and continued the slow descent. I knew the lower I went the higher my true air speed would be for the same Mach number. I had no Mach meter and as I found I had made a slight discrepancy in my chart I had no accurate means of knowing my true air speed. My radio compass was tuned to the Stirling radio range station which was my first check point. There was nothing to do but sit tight and wait.

"The tense feeling had gone and for the next few minutes I had time to look around. Everything was working well. My oxygen regulator was blinking away at me—always a comforting sight. The cockpit temperature was just right and I felt happy up there in the strong sunlight. I got an accurate check on my position at Stirling. The chart showed my ground speed to be over 630 m.p.h. It was then I knew the previous speed could be beaten. I was down to 25,000ft and my true air speed was increasing. I put the engine to full power and found, to my surprise, there was no buffeting. I opened it up a little further and carried on.

"After leaving Stirling I tried to tune my radio compass to Montreal radio but the needle wouldn't settle down. Ottawa radio gave the same result, so I switched it off and used my standby magnetic compass and map. This, I said to myself, was a nuisance. The shortest distance between two points is a straight line and I wondered how straight I was going to keep for the next 200 miles. I was getting near the haze now and could only see about 30 miles ahead. I started to worry about my next time check at Kingston. Would I be able to see it accurately? I began to sweat.

"Because of the poor visibility I missed Kingston and I carried on using a compass course for Montreal. I was now flying a little over maximum power and my indicated air speed was increasing. The air was very rough at 20,000ft and it was really uncomfortable. The bumps felt solid at this speed and I was getting jolted up and down in the cockpit. It was too hot and I felt miserable. I just hung on and kept going, knowing that Montreal was only five or six minutes away.

"The visibility improved and there was Montreal ahead. I increased my rate of descent and let the aircraft buffet a bit. It was mild compared to the buffeting a few minutes before. I crossed over Cartierville tower at 13,000ft absolutely flat out. I clicked my stopwatches and checked the time—28 minutes 35 seconds—665 m.p.h.

"As I throttled back and did a wide sweep around Montreal East and the end of the Island, I sat back and relaxed. My hands were shaking a little and I was sweat-soaked; but I was very elated. This Orenda-Sabre combination was good. . . . They had both been mistreated but they both seemed to enjoy it.

"Back over Cartierville I contacted the tower, landed, taxied to the Canadair plant and climbed out. I was tired and happy at the same time and I hoped I might have a chance to better even this time, sometime in the future. One of the Canadair test pilots walked out of the hangar as I went across the apron. His first words: 'What delayed you?' But he said it with a smile."

# HERE AND THERE

### World Gliding Championships

IT is reported from Madrid that the members of the British team in the World Gliding Championships, now in progress in Spain, had arrived at Carabanchel airfield, a few miles outside the city, by June 24th. Slight damage was sustained by Mr. Lorne Welch's sailplane when the trailer swerved into a tree near Bayonne during the trip out. The Championships were opened on June 30th by General Gallarza, the Spanish Minister for Air. In practice flights Mr. Frank Foster reached 17,000ft and Messrs. Welch and Forbes flew 150 miles.

### Saucer Research

THE U.S.A.F. has started a search to track down the origin of "flying saucers", discloses General Vandenberg, U.S.A.F. Chief of Staff, quoted by *Look*, the New York magazine. The Air Force, it seems, is now experimenting to verify a theory of Dr. Donald Menzel, of Harvard University, that the "saucers" are an optical illusion caused by temperature, which projects images of earthly lights into the sky. Asked by the magazine about the Air Force's revived interest in the phenomena, General Vandenberg was quoted as replying: "The Air Force is interested in anything that takes place in the air. This includes the aerial phenomena commonly known as flying saucers. Many of these incidents have been satisfactorily explained. Others have not. With the present unrest, we cannot afford to be complacent." The article said that the Air Force has collected details of more than 800 incidents in which "flying saucers" were seen, of which 38 per cent were classified as astronomical bodies, 13 per cent as balloons, 10 per cent as too nebulous to be of value, 22 per cent as birds and aircraft, 2 per cent as hoaxes and 15 per cent as "unexplained."

*THE GIANT'S LAIR: A newly-released view of the Boeing YB-52 Stratofortress at Boeing Field, Seattle. The picture has been cleared by the U.S. Air Force in view of the fact that it is no longer thought practical to maintain security concerning exterior details of the aircraft while test flights are in progress from the field. The wing span is 185ft, length 153ft, and tail height 48ft, and the eight turbojets are Pratt and Whitney J-57 dual-compressor units.*

### South Africa Pays America

THE Union Government has signed an agreement with the U.S. Government in Washington agreeing to pay in dollars for American logistical support to the South African Air Force in Korea. Already the Union has paid the U.S.A. about $9 million (£3,200,000 sterling).

### New Honour for Sir Frank

THE gold Albert Medal of the Royal Society of Arts for 1952 has been awarded to A. Cdre. Sir Frank Whittle, K.B.E., C.B., M.A., F.R.S., "for the development of the continuous-combustion gas turbine and jet propulsion." It is, of course, particularly appropriate that this award should have been made in the year when the first service by jet airliner has been inaugurated. The Albert Medal, which is the highest award bestowed by the Society, was instituted in 1864 to commemorate the presidency of the Prince Consort from 1843-1861. It is awarded annually for "distinguished merit in promoting arts, manufactures and commerce."

### Canadian-American Exercise

IT was announced by the Royal Canadian Air Force's Air Defence Command in Quebec on June 25th that a joint air-defence exercise with the United States Air Force will be held from July 19th-27th, under the title Exercise "Signpost."

### Canadian "Lanc." Conversions

AMONG the Lancaster conversions being turned out by Avro Canada at Toronto are long-range nagivational trainers, photographic reconnaissance machines (these are doing an excellent job in mapping the Canadian North) and variants for air/sea rescue, bomber/reconnaissance and maritime reconnaissance work.

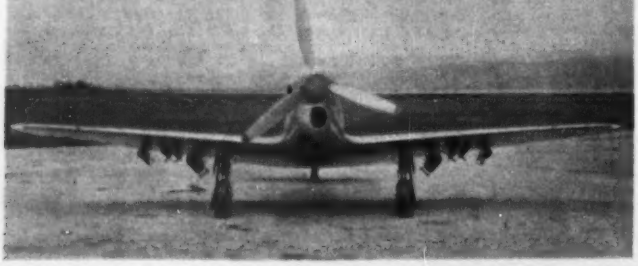
### Training Agricultural Pilots

THE first "agricultural pilot" school in Canada has been set up at Crumlin Airport, near London, Ontario, to teach pilots the proper methods of applying insecticides and fungicides from the air. One of the aims is to cut down the number of accidents caused by low flying above the fields, orchards and forests. According to Canadian Industries, Ltd., several millions of acres of tobacco, vegetables, fruit and forest land will be sprayed or dusted this year for the control of insects, plant diseases and weeds. In 1945 only 80 acres of crops in South Western Ontario were sprayed from the air, but this year some 50,000 acres are to be treated.

### New British Flying Film

THE world premiere of David Lean's film *The Sound Barrier*—the plot of which deals with test-flying by British pilots—is to be held at the Plaza Theatre, London, on Friday, July 25th. The proceeds of this performance will be in aid of the R.A.F. Benevolent Fund and the Royal Air Forces Association.

*SUPERSETTE is the alternative name of the Ambrosini Super S.7, seen here with a military load and entered by G. A. Ferrari for the Kemsley Challenge Trophy Race on July 11th. The engine is a D.H. Gipsy Queen 70/3 and the gross weight is 3,814 lb. Flying impressions of the S.7 appeared in "Flight" of August 24th, 1951.*



AT 157

# You'll be TURBOPROSPEROUS soon

Prosperity will be no will-o-the-wisp to the Viscount operator, but a real and substantial figure. With a fleet of these Vickers turboprop airliners in service, an operator will find: 1. Bookings rise because passengers prefer to fly in a Viscount—"there's no engine roar," they say, "it doesn't vibrate *and* it's safer with four engines!" 2. Serviceability is noticeably better, as a result of the smoother running. 3. Comfortable seats for 40-53 passengers plus extra large luggage and freight holds ensure high capacity payload at all times.

## VICKERS VISCOUNT

FOUR ROLLS-ROYCE DART ENGINES

**VICKERS-ARMSTRONGS LIMITED · AIRCRAFT DIVISION · WEYBRIDGE · SURREY**

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**What other available vehicle** can pick up six stretcher cases from a forest clearing 50 yards by 40 yards and convey them to hospital (or even on hospital ship deck) 45 miles away in one hour round trip?

*only* WESTLAND *HELICOPTERS*

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## HERE AND THERE . . .

### Full Circle

ACCORDING to a Tokyo report, Japan's National Police Reserve is to form an air section, and the man who may be chosen as its chief instructor is former naval air commander Hachiro Shoji—a pilot who took part in the air attack which sank the British battleships *Prince of Wales* and *Repulse* in 1941, with the loss of 700 lives.

### Fast-revving Rubber

THE B. F. Goodrich Company have developed a new tyre for high-speed fighters which, it is claimed, has completed a U.S.A.F. test programme involving simulated landings at 250 m.p.h. The company states that, while normal fighter tyres "have difficulty in surviving five or six landings," this new tyre remains good after fifty.

### There Was I . . .

FEATURED in a recent B.B.C. "In Town Tonight" programme were Cyril Peckham and Russell Adams, chief photographers, respectively, of the Hawker and Gloster companies. Interviewed by John Ellison, they told listeners of some of the more hectic aspects of air-to-air photography.

### Shopping Trips?

AMERICAN AIRLINES have found that 61 per cent of the passengers on its low-fare tourist flights are women; only 25 per cent of the travellers on full-fare services are of the fair sex. Only 32 per cent of tourist travellers fly on business, as against 75 per cent on full-fare services. One in six of the low-fare passengers is making his or her first flight, as against only one in ten of the full-fare travellers.

### America's Observer Corps

MEMBERS of America's Ground Observer Corps are being asked to maintain observation posts in 27 states. It is hoped eventually to provide coverage in 36 states and to increase membership from 150,000 to 500,000. At a recent meeting of civil defence directors in Washington, General Twining, acting Chief of Staff for Air, maintained that Russia could launch 400 B-29-type bombers, carrying atomic and conventional bombs, against all America's major industrial targets.

### To Assist Turbojet Production

THE first British licence for the use of the Solar Aircraft Company's process for producing complex sheet-metal shapes has been issued to Rolls-Royce, Ltd. The agreement follows visits to San Diego during the past year by Lord Hives, chairman of the board, accompanied by several Rolls-Royce engineers. The process—an ingenious one that considerably simplifies the design of intermediate-stage forming dies—was described in our associated journal *Aircraft Production* as long ago as August, 1947, when the method was at an early stage of development. It is said to be particularly suitable for the forming of stainless, heat-resisting steels.

*THE GOODYEAR "N" arrives at Lakehurst, N.J., Naval Air Station on her delivery flight from Akron, Ohio. Of 324.5ft overall length and 875,000 cu ft capacity, the "N" is—in the words of the picture-agency caption—"the U.S. Navy's largest non-rigid, lighter-than-air airship."*

*DR. R. F. B. BENNETT, M.P. for Gosport and Fareham, and secretary of the Conservative Air Committee, at the controls of the Sperry Gyroscope Company's Anson, in which he recently gained practical experience of the latest Sperry instruments.*

## IN BRIEF

THE second U.S. Transport Aircraft Hydraulic Conference, organized by Vickers Inc., of Detroit, is to be held at the Park Sheridan Hotel, Detroit, on October 28th-29th.

* * *

Mr. N. McPherson has been appointed a director of Aluminium Corporation, Ltd., and not, as stated in a recent paragraph, of the British Aluminium Co., Ltd.

* * *

Some 450 employees of Rubery, Owen and Co., Ltd., Darlaston, recently attended a "long-service" dinner. Mr. A. G. B. Owen (chairman and joint managing director) presented awards in recognition of a total of no less than 8,005 years' service.

* * *

Edgar Vaughan and Co., Ltd., Legge Street, Birmingham 4, specialists in heating-treatment compounds, cutting oils, etc., have issued an informative little booklet on the subject of quenching.

* * *

Designed for quick and easy reference, a revised and enlarged edition of *Valves and Tubes for Industry and Communications* has been issued by Mullard, Ltd., Century House, Shaftesbury Avenue, London W.C.2.

* * *

A Branch of the de Havilland Aeronautical Technical School has been opened at the firm's Airspeed division at Christchurch, Hants. At present being equipped, the school will have a yearly intake of between 60 and 70 students. There will be three grades of entrance: apprentices in either trade or engineering, and engineering graduate.

*ENRAPTURED: More than 3,500 schoolboys visited the recent schoolboys' exhibition held by Rolls-Royce, Ltd., at Derby, where carefully arranged exhibits showed typical aspects of the company's work. Here some of them are seen watching apprentices working on a Derwent.*

D

# FLYING a FRENCH LIGHTWEIGHT

## *Air Impressions of the Aérocentre Cub*

By JAMES HAY STEVENS

SINCE the war the French industry has had a good deal of Government support for the development of light aircraft. First, there was the competition for three-four seaters in 1946 that was won by the Norécrin, then in 1947 there was another for two-seaters. There was a lot of delay about announcing the winner of this last competition—perhaps because it was the private enterprise Sipa S-90 and not a product of one of the nationalized factories. However that may be, I flew the prototype S-90 in 1948 and found it delightful. It is about the size of the Tipsy Belfair and has similar handling characteristics, for, although it is diminutive, all the flying qualities of a high-powered aeroplane are reproduced without vice.

The foregoing is not a digression, but is a necessary preamble to writing about the runner-up, the Aérocentre NC-853 Cub, because of the latter's entirely different characteristics. The French authorities left the competitors a pretty free hand in their design, the essentials being side-by-side seating, engine starting without airscrew-swinging, a 75 h.p. engine and full control at a gentle, symmetrical stall. Both the Sipa S-90 and the NC-853 Cub achieve these properties, but in widely different ways. The Sipa is completely conventional in appearance, while the Cub is unusual.

The Cub has had a rather chequered career because its makers, the S.N.C.A. du Centre, were dissolved in 1950 and the Cub is now in the care of the S.N.C.A. du Nord. Then the 100 Cubs completed and lent to the French flying clubs by the Government were grounded last year for a time because of troubles with the engines and cracks in the wing spar. These faults have now been put right and the Cub is back in service. It was announced last March that 112 of the NC-856 four-seater version of the Cub with the 135 h.p. Regnier 4LO have been ordered by the French Army.

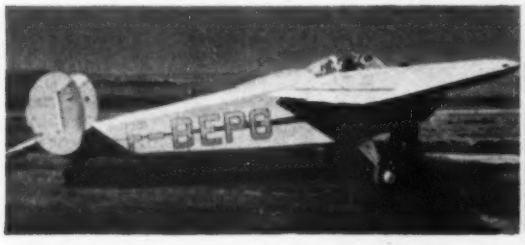
The designer of the Aérocentre Cub took the well-tried, fabric-covered tubular fuselage and tail, with a fabric-covered metal-framed wing for easy maintenance, which have served so well on many a light aeroplane, including the Auster, and to them he added a robust undercarriage with oleo shock-absorbers. The good downward view of the high wing was retained, but its blind spot was eliminated by the raising of the cabin above the leading edge. This has not made the entry easier than on an Auster, and it could prove embarrassing to members of the fair sex not specially dressed for the occasion. The fuel tank is under the seat—and the gauge is, of all places, between the cushions!

*The cabin of the Aérocentre Cub is not over large, even for two. Most of the controls are readily recognizable in this picture; the flap lever is just out of view, since it is in the roof between the pilots.*

The cockpit is on the small side and the massive T-piece to which the control cow-horns are attached takes up a good deal of space. (On the four-seater NC-856 the dual sticks are mounted on a tubular bridge like that on the Auster and this arrangement is available as an alternative on the Cub.) The range of instruments is sufficient and they and the controls are well enough placed, centrally. The usual rather inadequate Continental spherical bowl-compass is mounted near the top of the windscreen. The single throttle control sticking up out of the dash is not convenient. The hand-cranked inertia starter on the Minié flat-four is much more civilized than the airscrew swinging that is still the rule on small types in Great Britain.

For taxying, the view all round is excellent and the toe brakes on the rudder pedals, although not powerful, are adequate for steering—nevertheless, I prefer the British differential type. Take-off is quite simple and it does not seem to matter much whether you get the tail up or not. When I tried the Cub at Toussus-le-Noble, both the ground and air were crowded and the runway was into the afternoon sun, so that

*These views show how good is the all-round view from the Cub. F-BEPG, the machine the author flew, is having its engine started by a mechanic. The production NC-853 differs from the prototype NC-850 in having twin rudders, a feature that contributes largely to the stability at the stall.*



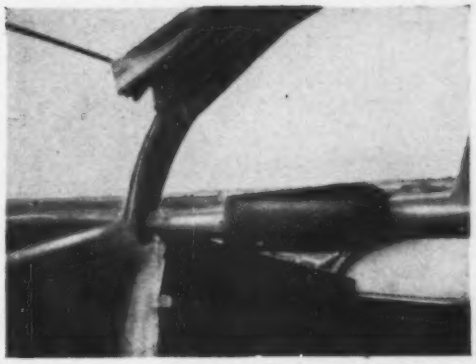
**CUB NC-483 DATA**

| | |
|---|---|
| Engine | Minié DC-32 |
| Type | Flat four, air-cooled |
| Capacity | 3 litres |
| Dry weight | 175 lb (86.6 kg) |
| Take-off power | 80 h.p. at 2,610 r.p.m. |
| Rated power | 75 h.p. at 2,575 r.p.m. |
| Cruising power | 53 h.p. at 2,300 r.p.m. |
| Span | 36ft 11in (11.3 m) |
| Length | 22ft 5in (6.85 m) |
| Wing area | 15.4 mz |
| Tare weight | 800 lb (363 kg) |
| Gross weight | 1,410 lb (640 kg) |
| Maximum speed | 99 m.p.h. (160 km/hr) |
| Cruising speed | 87 m.p.h. (140 km/hr) |
| Landing speed | 40 m.p.h. (65 km/hr) |
| Range | 310 miles (500 km) |

there was not much chance to compare the merits of flying off or raising the tail and then lifting her off; on the whole I thought it was better to let the machine fly off. The nose was held high for the best climb at about 62 m.p.h. I.A.S.

In the crowded air the all-round view was certainly a blessing, particularly in the rearward hemisphere, both above and below the wing. This certainly seems a layout worth developing for private aircraft, especially when the air gets busier. The simple adjustable air-scoops for ventilating the cabin kept it cool on a very hot day and could well be adopted on other types. General flying is ordinary for a low-powered type, that is to say, it is rather sluggish, and there is a tendency to wallow at the modest cruising speed of 140 km/hr (87 m.p.h.). Although light, the rudders are, surprisingly, rather ineffective in normal flight. The noise is on the high side, because one is very near the engine; but conversation is possible.

It is, however, in the low-speed performance that the machine is unusual. The makers claim that it is unstallable; that is true, but with qualifications. With the flaps up or down the Cub stalls with the nose high in the air and with the A.S.I. right off the clock—actually this is position error, since the true stalling speed is about 65 km/hr (40.5 m.p.h.). At the stall, the nose dips a little, but it can be held up by keeping the stick right back, when the machine sinks in a mushy stalled glide. One or other wing soon drops and, if left alone, the Cub will spiral off in that direction, gaining speed slightly. It will not respond to the rudder, but the wing can be lifted on the ailerons and a sort of gentle falling-leaf can be executed. The nose is very high during all this and the forward view is negligible, because of the square engine cowling.



*The unusually good rear view from the Cub is shown by this photograph, taken from the port seat over the other headrest.*

The approach is made at about 100 km/hr (62 m.p.h.) indicated, which is probably, also, the true air speed. In the glide the nose is fairly high and at the final round-out and touch-down there is a decided blanketing of forward view. A stalled approach can be made and the oleo undercarriage can absorb pretty heavy landings.

The Cub is certainly easy to fly, but it is not, to me at any rate, an exceptionally pleasant flying machine. As the makers claim, it would be difficult to kill oneself in it, for it cannot be got into an attitude in which it is out of control—it is quite unspinnable and virtually unstallable. Nevertheless, such a virtue might have undesirable results when the pupil graduated to other aircraft.

While this may be taken as a criticism of the average aircraft of today, it would seem to be impossible to design a completely safe machine that really *flies* as well. Personally, I think it is better to teach pilots to fly properly, as they would on the Sipa; for if they cannot learn to fly anything more difficult than a foolproof type like the Cub they ought not to fly at all.

## S.B.A.C. OFFICERS

AT a meeting of the Council of the Society of British Aircraft Constructors, held on June 25th, Mr. H. Burroughes, F.R.Ae.S., was elected president for 1952-3; Mr. J. J. Parkes was elected vice-president, and Mr. W. T. Gill (who was president from 1950-2) deputy-president. Sir Frederick Handley Page, C.B.E., was re-elected hon. treasurer.

Mr. Burroughes, who is deputy managing director of the Hawker Siddeley Group, first held office in the society in 1931-3, when he was deputy chairman (aircraft), an office which he held again in 1935-6. He was vice-president of the society in 1943-5 and 1950-2.

*Mr. H. Burroughes*

Mr. Burroughes entered the R.A.E., Farnborough, in 1909. Five years later he became general manager and director of the Aircraft Manufacturing Co. Then, in 1917, he was one of the founder-directors of the Gloster Aircraft Co., Ltd. Mr. Burroughes is also a director of H. M. Hobson, Ltd., and of a number of companies in the Hawker Siddeley Group.

Mr. J. J. Parkes, the vice-president, who succeeds Mr. Burroughes in that office, is chairman and managing director of Alvis, Ltd., and chairman of Alvis Mechanisation, Ltd. He has been vice-chairman of the society's sales and export committee since 1948, and a member of the management committee since 1949.

The following were elected to the management committee in addition to the four officers mentioned above: Mr. Robert Blackburn, O.B.E.; Mr. A. F. Burke, O.B.E.; Mr. H. T. Chapman, C.B.E.; Sir Roy Dobson, C.B.E., J.P.; Major Sir Hew Kilner, M.C.; Mr. H. G. Nelson; Mr. J. D. North; Mr. F. E. N. St. Barbe; Sir Frank Spencer Spriggs, K.B.E.; Mr. W. R. Verdon Smith, and Mr. C. C. Vinson. Associate members' representatives are Mr. E. I. Scott, M.C. (Group A); Mr. L. A. Morgan, and Mr. E. Sayers (Group B).

## HEAVY ALLOY

SOME interesting details have lately been released concerning the method of manufacturing G.E.C. Heavy Alloy, a 90 per cent tungsten material much used for aileron-balances and similar components calling for a heavy mass in a compact space. Lead is only 60 per cent as dense as Heavy Alloy, which weighs twice as much as steel, but is as strong.

The alloy is made by mixing powdered tungsten with nickel, copper and wax to bind it together, and compressing the resultant compound at between 5 and 10 tons/sq in. When it comes out of the press it has something of the consistency of cigar ash, i.e., it just holds together.

It is then heated in a hydrogen atmosphere to 1,000 deg C, which removes the wax and hardens the compound, but without changing its dimension. Next, it is sintered in a furnace for 15 minutes, during which time it shrinks by about 20 per cent, increases its density and solidifies.

Paradoxically, design-considerations may in some cases mean that use of an ordinary metal for mass-balancing would, in the end, involve a greater weight of material—and this without the added advantage of compactness.

*Personnel of the Central Flying School Examining Wing during their tour of the Middle-East Air Force. The aircraft is the Vickers-Armstrongs Valetta, which "never gave so much as a cough" throughout.*

## *A Middle East Trip with Officers of the C.F.S. Examining Wing*

By HAROLD DVORETSKY

**THIS account, by an accredited correspondent who accompanied the party, gives a very fair idea of what the C.F.S. Examining Wing has to do, and what it sees, on a duty tour of R.A.F. operational units overseas. The author is London aviation correspondent of the "Sydney Telegraph."**

# EXAMINING TOUR

THE Central Flying School Examining Wing has just completed one of the most successful examining tours ever undertaken out in the Middle East. The Wing, comprising seven examiners under the command of W/C. E. Russell Bell, carried out more than 100 tests in the 24-day, 8,000-mile tour. Tests, including those for Instrument Rating Examiners, were carried out in seven different types of aircraft. The Wing examined at Luqa, Canal Zone generally, Nicosia and Aden.

The team consisted of S/L. R. G. Wakeford (deputy team leader) and F/L.s J. E. W. Teager, W. N. Gilmer, A. W. Ringer, E. A. Devillez, J. C. Steele and R. E. C. Kendall. F/L. P. D. L. Roper, a medical officer from the R.A.F. Institute of Aviation Medicine at Farnborough, accompanied them, with the principal objects of studying local conditions and problems, and contacting M.O.s of M.E.A.F.

All flying along the 8,000-mile route was shared by the members of the team. Navigator for the flight was F/L. Norman Penny, loaned from Swinderby, while F/Sgt. T. McHugh handled the signals side. Four airmen, headed by Cpl. D. H. Short, were carried for general maintenance work on the practically brand-new Valetta which transported the team throughout the tour.

To the airmen—L. A/C. D. B. Winslade, A/C. G. F. M. Rose and S. A/C. B. Pirrie—must go full marks for the general condition of the aircraft throughout the trip. Under their careful maintenance the Valetta never gave so much as a cough, and radio trouble was practically non-existent.

The Wing left Little Rissington at 0630 hr on April 28th, and after breakfast and Customs clearance at Lyneham, headed for Luqa *via* Istres. Because of the short legs, flight-planned before leaving Little Rissington, the speed of the Valetta was stepped up from 140 kt normal cruising to 170 kt. With this speed and reasonable conditions we reached Istres in 3 hr 5 min. Our "blues" we found were decidedly uncomfortable, as Istres was basking in warm sunshine. After refuelling and lunch at the French Air Force mess we took off again inside the hour.

With the better cruising speed the Valetta made Luqa in just under 3½ hr. In Malta 16 tests were carried out in Meteors and Lancasters.

Luqa is quite the busy airport. Besides R.A.F. and civil aircraft, which are based there or which pass through frequently, there are always a fair number of American machines to be spied in the disposal area. Before leaving we talked to S/L. Peter Fisher and his navigator, F/L. John Thorpe, both R.A.A.F., who had arrived the night before, ferrying the Canberra which was to be used in Woomera Rocket Range experiments. A week later these two were to have congratulations poured on them for cutting down flying time between the U.K. and Australia to under 24 hr.

After a short stop for refuelling at El Adem we went on to Fayid. Total flying time, for those interested, was just under five hours for the near 1,000 miles—a goodly effort.

Ismalia town itself still showed signs of rioting. The police station, which received an unmerciful battering from General Erskine's troops during the riots in January, was being rebuilt, but still presented a sorry picture.

During my stay in the Zone I visited 206 Group, which controls all supply and maintenance for the R.A.F. in the Canal Zone. Such work is vital, if rather unglamorous; but it was only because of 206 Group that the R.A.F. were able to get over most of its difficulties during the recent troubles. Aircraft flying thousands of men and tons of freight into the Zone; fighters and bombers which patrolled within its boundaries; British families in the earlier days of the trouble; the R.A.F. Regiment and other Air Force units; and even the British Army in Egypt itself—all depended in some way upon the support of 206 Group.

It seems to be the Group's fate to come into being at times of stress and strain for the R.A.F. It was originally formed in Cairo in June 1941 (in the critical days of the Western Desert operations) to control and increase the efficiency of supply and maintenance within the then Middle East Command. Its rôle in the desert campaigns alone would fill a small volume. After the cessation of hostilities the Group went out of existence at midnight on February 28th, 1946. On June 1st, 1951, during acute political unrest in Egypt and only 4½ months before fighting and bloodshed were to sweep the Zone, the Group was re-born. Soon it had absorbed all maintenance and certain other units of No. 205 Group, thus leaving that Group free to run itself as a purely operational flying unit.

Under the change, a noticeable improvement in maintenance service given to operational units has been seen. The first

*Up-front in the Valetta are F/L.s A. W. Ringer and J. C. Steele. Cruising speeds of 140 kt-170 kt were generally maintained during the tour.*

A.O.C. of 206 was A. Cdre. F. W. Felgate, C.B.E., who recently returned home at the end of his Middle East tour of duty.

The Group's many responsibilities, all vitally important during the emergency, included the supplying of scores of items needed by operational squadrons and ground units of all kinds; the servicing and repair of airframes, engines, armaments and even marine craft; servicing maintenance and operation of motor transport, all-important to the life of the R.A.F. in Egypt; radio servicing and fitting for the maintenance of communications; storage and issue of explosives, pyrotechnics and the like; and the manufacture of compressed gases such as breathing and welding oxygen.

The Zone emergency was upon 206 Group before it was anything like fully organized. But figures in its headquarters' files show how it tackled many tough assignments during the nine months (which included part of the Persian oil crisis) between June 1st, 1951, and March 31st, 1952, and particularly during the last six months of this period.

Fuel for flying and other purposes is required in tremendous quantities in the Canal Zone. During the above mentioned nine months 206 Group's No. 51 M.T. Coy. alone carried over 10¼ million gallons over Zone roads, covering nearly 1¾ million miles in the process. The same company did a magnificent job of transporting British families from their homes to R.A.F. stations, and from stations to Port Said when they were evacuated to Britain. They also moved the families' furniture, in many cases wrecked, from their homes to storage at R.A.F units. Much of the usable furniture was subsequently bought by the Air Force through 206 Group.

In the same period, during which, for six months, the R.A.F. was left entirely without locally employed civilian labour, stevedores, etc., and had to employ its own personnel, the Air Force imported into the Canal Zone 26,814 tons of freight, mostly by sea, and exported 7,037 tons. R.A.F. airmen loaded and unloaded scores of ships at Canal Zone ports, and between January 1st and March 31st, 1952, handled 41 troopships and 93 freighters alone. In addition, some thousands of personnel were embarked or disembarked.

This and many other jobs, including the housing of Cypriot and East African labour brought in to replace the Egyptians, were all undertaken by the Group.

One of 206's greatest headaches in the emergency was the repair of footwear. The time did arise when arrangements had to be made for certain stations to send boots and shoes by air to R.A.F. stations at El Adem, Habbaniya in Iraq, and Amman in Jordan. All footwear repair is now done in the Canal Zone at centres established for the purpose by the Group.

During the week in the Canal Zone the examining teams were kept busy. In all, 70 tests were carried out, in Valettas, Meteors and Mosquitoes.

From the Canal Zone the Wing went over to Nicosia. Here, in everyone's estimation, is the perfect place for a posting. We took advantage of a full mess at Nicosia and a week-end to stay in Kyrenia and found the Cyprus brandy (6s 6d a bottle) and the crystal waters of Cyprus both to our liking.

*A Lockheed Neptune patrol bomber of the U.S. Navy on the strip at El Adem. The crew-members are reclining in the shade of the wing.*

*Ground crew attending to the needs of the Vampire fighter/bombers of a Squadron in the Canal Zone. A Meteor 7 is dimly discerned beyond.*

Cyprus is becoming a popular headquarters for Middle East aircraft representatives. Bill Humble of the Hawker Siddeley Group, who previously had his headquarters in Cairo, has now settled with his wife in Kyrenia. Bill told me he finds Cyprus not only a pleasant place in which to live, but geographically well placed for getting all over the Middle East.

After the week-end break the examining teams went back to work and three tests were completed in Meteors. Then we made the long hop down to Aden—just under 2,000 miles from Nicosia—in one day. Flying time was less than 9½ hr. The Valetta, though padded, was inclined to be noisy on such a long hop.

Aden was as hot as only Aden can be. Temperature on one day during our stay was 106 deg, with 84 per cent humidity—decidedly hot. Despite this, I never spoke to one officer or airman who didn't think (contrary to general opinion) that Aden is not a good posting. I must admit I found the weather trying.

I had not visited Aden and Khormaksar for four years. A lot has been accomplished by way of living quarters since then. There are now long lines of very pleasant quarters, either fully erected or in course of erection. Aden Protectorate possesses what must be one of the most unusual hospitals in the service—the Aden Protectorate Levies Hospital, which is under the command of flying doctor W/C. "Sandy" Barker, now acting P.M.O. for Aden. Under his supervision the hospital (built for the Indian Army in 1940 and taken over by the R.A.F. in 1947) has been renovated. Looking after the health of Levie troops also entails looking after their families as well. I believed W/C. Barker when he claimed he and his staff of six medicos (including three National Service doctors) had a "busy but interesting time."

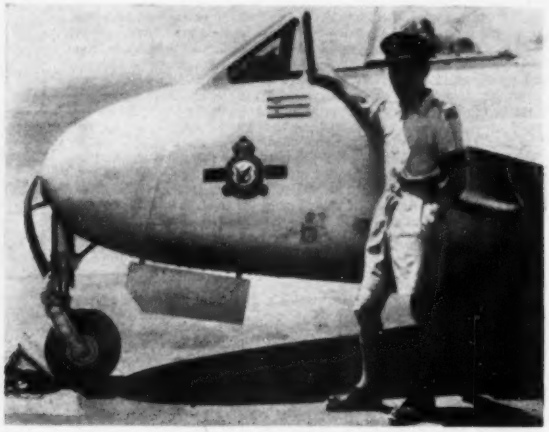
The busy part is that the small but compact hospital has a bed average of 50, and in addition to this there is a separate ward for wives and families. This does present difficulties, especially when it is learned that some wives are in purdah. The interesting side is the great variety of medical ailments which the staff of the little hospital are required to treat. The day before we arrived an operation had been performed on a patient who had primary tuberculosis of the ulnar nerve—something, according to W/C. Barker, unheard of in medical records. The most prevalent diseases among the native troops and their families are tuberculosis, leprosy and cancer.

An air-conditioned operating theatre redesigned by W/C. Barker and his staff is the pride of the Levie Hospital. No wonder; it seemed as well equipped as most R.A.F. hospitals anywhere in the East. For the doctors there is also something else in its favour: twice yearly one of the medical staff packs a Jeep and goes up country to the Levies' medical outposts. These trips sometimes entail journeys up to six weeks, and cover thousands of miles up country.

Despite its hot and humid conditions Aden could, I imagine, grow on one. Though all of us were wanting to press on we thoroughly enjoyed our stay. I felt, despite the climate (a Turkish bath has nothing on climbing into an uncovered Brigand or Buckmaster about mid-day) I was inclined to agree with the A.O.C. Aden, A.V-M. Douglas MacFadyen, that an Aden posting is not the end. In fact, if anything, it can be very pleasant.

At Aden the Examining Wing carried out ten tests, including two I.R.E., in Buckmasters and Valettas.

On the way back we stopped for a week-end at what is the smallest of all R.A.F. stations, that of Asmara in Eritrea. Perched nearly 8,000ft up (local R.A.F. claim it to be the highest R.A.F.



*Left, S/L. Peter Fisher and F/L. John Thorpe, R.A.A.F., who ferried a Canberra to Australia in record time, called at Luqa while the author (seen in war correspondent's uniform) was there. Right, S/L. Pat Kennedy, Officer Commanding a Vampire squadron stationed in the Canal Zone*

## EXAMINING TOUR . . .

station in the world) one gets a slight shock to see Austers parked on the strip.

Eritrea, Mussolini's former colony in north-east Africa, held the first general elections in her history a few months ago in an atmosphere from which an ugly tension had been totally expelled. Less than a year before widespread banditry had harassed the British Administration and threatened to plunge the country into grave disorder. The overpowering by armed villagers earlier this year of Tesfai Merit, notorious gang leader and common law-breaker, marked the eclipse of the Shifta as a co-ordinated terrorist force.

Among measures calculated to rid the country of the lawlessness that had plagued it far too long was the calling-in of the R.A.F. to work with infantry and the Eritrean Police Field Force in flushing out the bandits. First Bristol Brigand bombers, then Spitfires, joined in anti-Shifta work. But as the tempo of terrorist activities began to mount in mid-1950 a flight of A.O.P. Austers from Tripoli took over the task of locating armed bands of terrorists. The Austers kept mobile ground-forces in touch with base, dropped supplies to them, flew out wounded and ferried police and Army chiefs about the country.

Today No. 1910 A.O.P. flight, which in two years has helped inflict reverse after reverse on the Shifta, is still in Eritrea, supporting police in subduing small-scale outbreaks that even now occasionally occur in the territory.

R.A.F. Asmara had, at the time of our visit, a total strength of one officer, one flight sergeant and eight airmen. The C.O. was F/L. John Teare, who at the beginning of this year was requested to form an R.A.F. officers' mess. An old Army mess, previously the home of some prosperous Italian, was taken over. Next September, when the Eritreans begin to rule themselves and the British forces leave, the mess will house the British Consulate.

Despite Asmara's unusual geographical position, F/L. Teare has to handle on an average 40 R.A.F. machines a month. First-line servicing can be done on the station—which is based at the civil airport. If need be, 11 visiting officers can be accommodated in the mess in Asmara township—which is also the quarters of F/L. Teare's wife and two children. Messing is under the supervision of Mrs. Teare, who makes everyone feel at home.

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# THE TREASURY ON AIRCRAFT EXPORTS

STRIKING tribute to the value of British aircraft in the export market is paid in the June issue of *Bulletin for Industry*, published by the Information Division of the Treasury.

Recent developments in aircraft design, it is stated in a front-page article, have given the United Kingdom a clear lead over its major competitors. If this lead is maintained during the next few years (and still better aircraft are already being worked on) we have an opportunity of developing aircraft manufactures as one of our major export industries.

Aircraft are an ideal export of the U.K. because of their exceptionally high conversion value, says the *Bulletin*. In the ratios between the value of the finished product and the price of its main materials they are excelled in the engineering industry only by precision manufactures like watches. The jet airliner is mentioned as selling for about £10 per pound weight of aircraft compared with less than 10s per pound for a car—striking figures that have already been quoted in the pages of *Flight*.

The value of exports of aircraft and parts has been rising since 1945 and reached £42,000,000 last year, says the report. This compared with £365,000,000 for machinery and parts, £291,000,000 for motor vehicles and parts, and £53,000,000 for ships and boats. *Bulletin for Industry* then states: "Aircraft are thus already an important export. Only a small part of the total, however, has consisted of aircraft for civil purposes, because the U.K. has been unable to offer machines suitable for the world's main airline routes. Nevertheless, steady progress has been made in building up exports of smaller machines such as the Bristol Freighter, the Dove (a dollar-earner), the Heron, the Auster, small helicopters, and other types.

"This situation has changed; now with the Comet we have in operation the first jet airliner in the world. The Viscount and the Bristol 175, turboprop air liners, will also be the first of their class. Potentially our competitive position is very strong. Four overseas airlines, for example, have already placed orders for the Comet and the prospect for the other types is excellent. At present, about 40 turbine-engined airliners are on order from overseas and there is little doubt that this figure will rise sharply when the time comes . . . for the world's civil lines to replace their fleets.

"Success or failure in this field will depend largely on our ability to offer timely and assured delivery. Here formidable problems have got to be overcome. The capacity of the industry, in both airframe and aero-engine sections, is increasing rapidly (for instance, de Havilland plan to double the output of Comets) but the demands arising from the defence programme are heavy. The Government regards aircraft exports as of great importance and is trying to avoid conflict between export and defence needs.

"Certain specific shortages face the aircraft industry, e.g., the shortage of compressor blades, but the major shortage is manpower. Here considerable progress is being made. Employment in aircraft manufacture fell swiftly as the industry contracted after the war and by mid-1948 was down to 142,000. Since then the total has expanded, and manpower has been steered towards the industry whenever possible. Between mid-1950 and March of this year the total employed in the manufacture and repair of aircraft rose by 37,000, an increase of a quarter. But serious shortages, particularly of skilled labour, remain."

As readers may know, *Bulletin for Industry* is intended primarily as a progress report on various aspects of British industry. With that reservation in mind, it is still gratifying to note that the problems of aircraft manufacture are so clearly and concisely understood by the Treasury. It is particularly significant to note the emphasis placed on export value per pound weight.

# 2 out of 3

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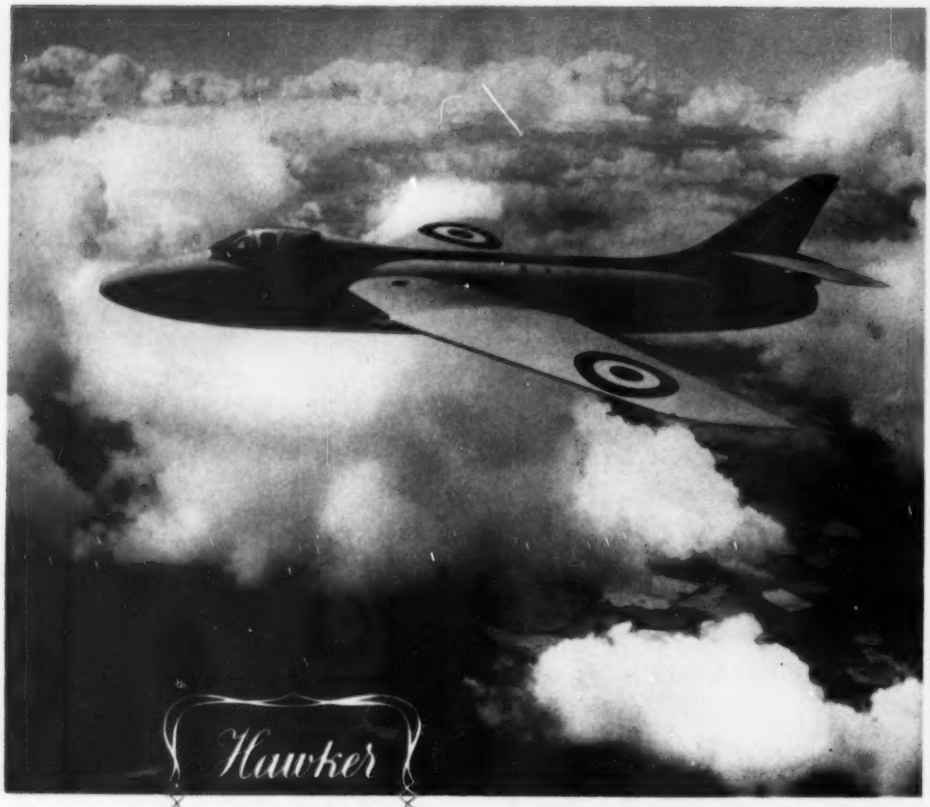


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# FACILITATING AIR-TRAFFIC CONTROL

## *Well-planned Radio and Other Services in Dunsfold's New Control Tower*

THE Air Ministry airfield at Dunsfold, near Godalming, was until recently the operational base of Skyways, Ltd. Now it is occupied by Hawker Aircraft, Ltd., and will be used for flight testing—their airfield at Langley being on the small side for modern fighters, and inconveniently near London Airport. Sea Hawks and Hunters will, of course, be the principal users of Dunsfold in the months to come; the second Hunter prototype flew there on May 5th last.

Production flight-testing is likely to demand much greater flying intensity than has been common at Dunsfold in the past. To permit this, a new control tower has now been built, in which is housed some of the latest radio equipment, planned, supplied and installed by International Aeradio, Ltd.

The controller is provided with three ground/air V.H.F. channels, two of which provide automatic D/F bearings. In addition there is a further V.H.F. channel for communication with the fire tender and direct telephonic communication with key points—in addition to the normal airfield telephone facilities.

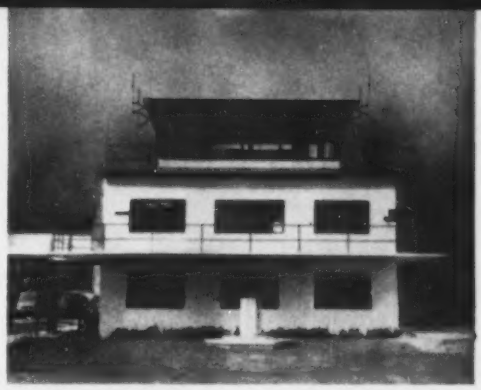
The air-traffic control desk has been specially designed by I.A.L. to ease the controller's task. The central panel provides local meteorological information, including time, barometric pressure, and wind speed and direction, the two latter indicators being driven from an anemometer-head and wind-vane mounted on the tower roof.

On each side of the central panel are mounted loudspeakers for the Pye V.H.F. receivers. No volume controls are necessary, the amplifiers being so designed as to provide constant output volume irrespective of input signal strength. For channel identification, the controller has, close to his left hand, four luminous indicators with the relevant frequency engraved on the cap of each. When a channel is calling, the appropriate indicator lights up; for transmission, the controller has merely to depress the required indicator and speak into the table microphone.

When two aircraft call at the same time on different frequencies, the controller can cut out reception on one channel by lightly pressing that indicator; he can then talk on the other frequency without interruption. A fifth indicator gives broadcast facilities which can be used in the event of emergency.

Two telephone handsets are vertically mounted in the desk. One of these is connected to the airfield exchange for normal calls, while the other can be linked directly with selected numbers—such as the briefing room or fire station—by operating a telephone-control panel mounted in front of the radio controls.

Directly in front of the controller is mounted a map, protected by plate glass and covering a radius of 70 miles from Dunsfold; this is for use during controlled descents and homings. Upon a second map, mounted on a sloping panel on the left of the desk, can be plotted the D.F. bearing of an aircraft from Dunsfold, Hatfield, and Chilbolton, in order to provide a rapid fix. To the right of the controller is an aircraft-movements board on which can be checked the progress of all Dunsfold-controlled aircraft. The extreme left-hand side of the desk contains a panel for the control of all airfield and approach lighting.

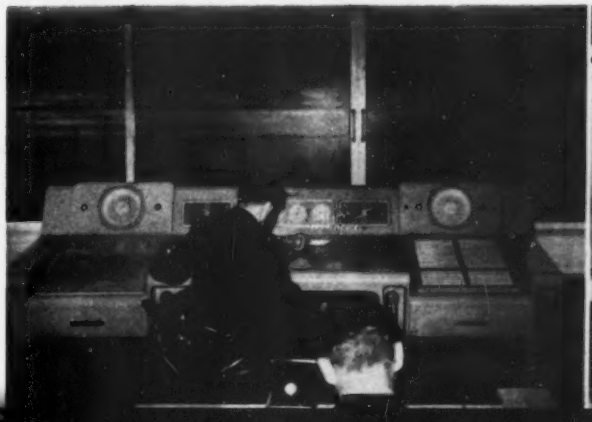


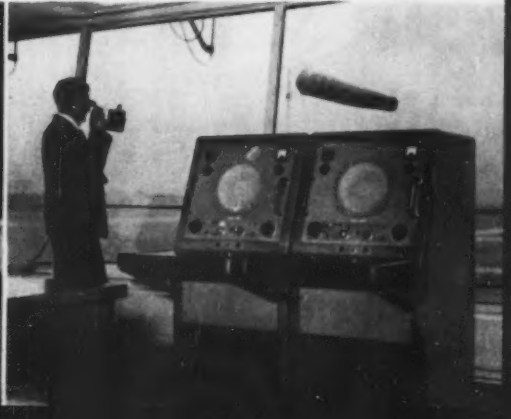
The large circular indicators on each side of the controller present, simultaneously, two sensed bearings on two different frequencies, supplied by the Marconi AD.200 V.H.F./D.F. equipment. The D.F. aerial assembly is mounted on a pivoted tubular mast, the main receiving sets being housed in a small building on the airfield; from this building the tower indicators are fed by two pairs of telephone lines. In the tower are two remote-control consoles containing demodulators and phase-comparison units which provide the voltages to operate the desk indicators. The bearing can be presented as a QDM or a QDR, the selection being indicated by a lamp beside the desk indicator. This AD.200, incidentally, is suitable for use with an aerial system up to 30 miles from the control tower.

The air/ground radio equipment is installed in twin lockable rack cabinets. Both the Pye V.H.F. transmitters and receivers are crystal-controlled, the former with a 10-15W output on the civil aviation band and the latter being of the double superheterodyne system, with a noise-compensated, carrier-operated muting circuit. The two radio cabinets also house the constant-volume auxiliary amplifiers, together with microphone amplifiers (which incorporate relays for switching on transmitters and for other functions), and power units for operating relays and indicator lamps.

*Principal user of the International Aeradio installations at Dunsfold will be W/C. B. F. Coupman, the Hawker senior air-traffic control officer. He will be assisted by W. D. Willis, seen with the Aldis lamp in the background.*

*On either side of the control desk is mounted a remote indicator presenting the controller with a sensed bearing, the two units giving different bearings on different frequencies. They are fed by the Marconi AD.200 V.H.F./D.F. sets, the remote-control consoles of which are illustrated on the right.*





# GANNET

SEEN in various conditions of flight is the production-model Fairey Gannet anti-submarine prototype, with its recently incorporated auxiliary tail-fins. The Gannet is the only super-priority type on order for Naval Aviation, and its design background was discussed by Mr. D. A. Hollis Williams, B.Sc., F.R.Ae.S., in a paper delivered before the Royal Aeronautical Society on March 29th, 1951. Therein it was remarked that the aerodynamic design, with regard to the wing area, tail volumes, and so forth, was based on the continuous rating of one unit of the Armstrong Siddeley Double Mamba. Mr. Hollis Williams also made the point that the "double" engine had particular virtues for naval use, as all the power was delivered on the centre-line of the aircraft. True, with the increased folded dimensions permitted in the larger modern carriers, it is possible to have engine nacelles on the wings and to provide aerodynamic arrangements and control which would enable such a machine to be handled on one engine; but single-engine deck landings with a conventional "twin" must always involve difficult handling problems for the pilot, whereas, with an engine like the Double Mamba, provided that the operative unit is delivering sufficient power to give the required slow-speed, engine-on approach, then deck-landing on one engine is no longer in the "emergency" category. The Gannet depicted is the third prototype; previous machines bore the serial numbers VR546 and VR557.

*"Peeling off" above, the production-type Ga presents its ample wing area to the cam*

*(Left) The Gannet in "search" trim, with sca lowered and one Mamba shut down.*

*(Right) With bomb doors open and both Mam at work, the Gannet is seen "cleared for actio*

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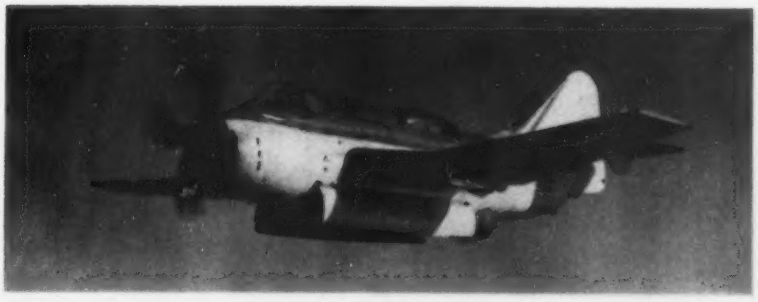

# About Bristol Helicopters

*An early flight of the Type 173, first British commercial helicopter and first of its type to be capable of flying on either of two engines.*

## *Plans for the Type 173: Air Impressions of the 171 Mk 3*

By THE EDITOR

THE publication last December by B.E.A. of an outline specification for a large commercial helicopter was not only an indication of what the Corporation foresaw as its own requirement a few years hence; for many people it was also something of an introduction to the characteristics of commercial helicopters as a class. Two main departures from existing helicopter practice were the insistence on twin-engine (or multi-engine) safety, and the need for a considerably higher cruising speed than has so far been provided. For city-centre operation there is no doubt at all that the insistence on twin-engined safety is justified.

B.E.A.'s proposed capacity of 30-36 seats will no doubt be approached by stages, just as the final design is to be extensible by degrees up to 45 seats. In the Bristol 173 we see the first important step towards B.E.A.'s specification, and it has already been stated the the Corporation will carry out trial operations with a prototype of this aircraft.

During a recent visit to Filton a great deal was learned about current thinking regarding operation and development of the Type 173. Mr. Raoul Hafner, Bristol helicopter chief designer, has an infectious kind of enthusiasm for his pets, and certainly it will be no fault of his if inter-city heli-buses are not operating before the end of the 1950s.

Of the various comparisons of operations with helicopters and fixed-wing machines which have been made, the majority have attempted to fit the newcomer into an existing pattern and to fly it according to fixed-wing standards. As a result, the helicopter's applications and future have sometimes appeared to be unduly limited—the more so when it is discovered that, for example, its structure-weight is currently some 5 to 7 per cent higher than for conventional types of airliner—say 72 per cent of all-up weight—and its initial cost relatively high unless large-scale production can be seriously contemplated.

For the same reason that a helicopter is today expensive, however, Mr. Hafner suggests that it can be expected ultimately to be cheaper than other types. The mechanical units (particularly transmission) represent a high percentage of the helicopter's weight and, in small numbers, are expensive. But as experience with large-scale production of piston engines has shown—and the two are comparable on this basis—good-sized production batches can be put through more cheaply than an equivalent unit weight of structure. In round figures a 10,000 lb a.u.w. helicopter having, say, 2,400 lb for payload might be sub-divided into two power units at 2,000 lb; transmission 800 lb; rotors, 300 lb; structure and basic equipment 4,500 lb. A comparable fixed-wing machine might be some 450 lb lighter, and the 800 lb transmission-weight would be represented in the structure and such things as flying controls and a heavier retractable undercarriage.

On many occasions helicopters will be able conveniently to share facilities with other commercial aircraft at main airfields, but for city operation airstops will have to be built. These are expected to be simple landing areas, possibly circular, allowing a 100-ft run into wind in any direction. The only facilities required will be those of a bus centre or railway station, such as the ticket office and passenger waiting rooms, and, in addition, lighting for night services. All servicing and refuelling is likely to be carried out at satellite stations around the city, which would also serve as diversion, emergency or holding fields. These would be directly comparable with bus garages or, on the railways, locomotive sheds and sidings. No refuelling or servicing would normally be carried out at the city airstops.

Traffic control and navigation are expected to be relatively simple with the aid of the Decca Navigator and V.H.F. communications. The whole pattern of helicopter operations normally being below that of the fixed-wing trunkline aircraft, there should be little or no interference at main airports. The helicopters would, if necessary, be able to fit in with the normal traffic pattern, and even with circuit procedures.

With the provision of Decca and a blind-flying panel adapted to suit the helicopter's flying characteristics (and including a yawmeter) only the worse weather would interfere with operations. Provided that the pilot could see the airstop lighting in fog or at night, after having reached a hovering point overhead at, say, 200 or 300ft, it is thought that he would be able to land safely.

Taking off from an airstop, the pilot will head into wind and possibly climb backwards initially in order to keep the airstop in view at the most convenient position ahead for an emergency landing. Twin- or multi-engined helicopters are not, however, concerned with safety height so much as with safety speed, and in the case of the Bristol 173 prototype 65kt is the figure to keep in mind for optimum minimum speed. Below this speed failure of one engine inevitably results in some loss of height while this speed is regained or, alternatively, necessitates an immediate landing. Above about 65kt engine failure need involve no loss of height and the pilot could continue to the nearest "garage" on the city perimeter. Not only would this somewhat larger area give him more margin for errors of judgment in a single-engined landing, but also (and obviously enough) the operators would not want to have an unserviceable machine perched upon an airstop above city buildings with no repair facilities available. With forward speed a single-engine rate of climb of 250 ft/min is possible on the Bristol 173.

Another important consideration is that of fuel reserves

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*Mr. Hosegood, at the first pilot's controls (to port), Mr. Raoul Hafner (in the rear seat), and the author prepare to take off in the rain. Note the large sliding-door and, above and below it respectively, the hand-hold and faired step. This aircraft has previously been used for deck-landing trials with the Navy and, to speed up the process of striking-down, the rotor blades were manhandled.* "Flight" photograph

## ABOUT BRISTOL HELICOPTERS . . .

for civil operation. Often it is assumed that helicopters will require similar reserves for holding and diversion as would a fixed-wing type, but it is now apparent that helicopters will almost certainly hold on the ground, with engines stopped, and that diversions would require only a few miles—five to ten perhaps—of additional flying. Thus, what are normally heavy fuel reserves on existing commercial aircraft can in the commercial helicopter, be practically ignored—or made over to the payload account.

It is to be expected that airfield charges would be relatively low for an aircraft requiring the minimum of aids and facilities, and a run of only 100ft as compared with the 6,000 to 8,000ft of concrete and an obstruction-clear approach for a modern airliner.

The Mk II production version of the Bristol 173 is intended to have two fourteen-cylinder Alvis Leonides Majors of perhaps 700 h.p. output each, and two pairs of stub wings. The all-up weight and speed will be increased considerably, and, using the same fuselage as the prototype, a 15/21-seat layout has been planned. Single-engine speed at, say, 13,600 lb a.u.w. would be about 90kt. The bulkheads are to be pushed outwards and more windows provided. The seats are to be arranged seven on each side ahead of the door, one opposite the door, and three behind. The seats themselves are stressed for 5g in all directions.

It may be well to digress momentarily and recall that the purpose of the stub wings—one pair of medium span at the rear and another pair of shorter span in front—is to unload the rotor disc, relieve high-speed lift/stall problems, and so permit higher aircraft speeds. These stub wings might quite appropriately be called palfs, for their duties are, in effect, the reverse of those of normal fixed-wing flaps—namely, the provision of extra lift at the high end of the aircraft speed range.

It is not yet certain whether the first pilot of a commercial helicopter will normally fly it from the port or the starboard side; in either case a new design of collective-pitch lever is being adopted for the Bristol 173 with a view to standardization later. Of "L" form, it carries the throttle twist-grip fine control transversely, and power is increased by twisting the grip forward (i.e., by lifting the wrist). Viewed from the starboard side, this is clockwise.

The shape, position and design of the instrument panel or panels on helicopters is still far from standardized. Both pilots need instruments and there should also be a good view ahead, downwards and upwards. The Bristol 171 which recently completed a tour of Scandinavia (it is illustrated here) has a new panel that, while something of a compromise, embodies the recommendations of the pilots. The placing of the blind-flying panel allows it to serve both pilots, as the angle of parallax in a cockpit of this size is not sufficient to cause discomfort. Most of the controls are grouped on a central pedestal, and in this case the second collective-pitch lever is also between the seats for left-hand operation (and to permit right-hand flying).

This machine, incidentally, was also fitted with new and very effective screenwipers, a sun vizor and, in the floor, a loud-hailer (for asking the way, according to the pilot, "Sox" Hosegood !).

## Bristol 171 in the Air

It was rather more than two years since I had flown in a helicopter when, with Mr. Hosegood at the controls, and Mr. Hafner seated aft, I took off in a Bristol 171, or Sycamore. Previously, I had made one or two cross-country flights in Britain and America, and had received some four hours' dual instruction on an early Westland-Sikorsky S.51. Although I was familiar enough with the 171 the comparative luxury of its interior and the suggestion of the limousine which it gives impressed me anew. Again, although no-one would have been more surprised than I if we had made a running take-off, the direct lift off the ground and rapid vertical climb took me rather by surprise.

Of the immediate impressions on first taking off, I recall something between surprise and, momentarily perhaps, slight alarm at the lack of forward speed and unusual motion relative to the ground. I suppose most fixed-wing pilots must experience this feeling during their first moments of flight in a helicopter.

At first I followed Mr. Hosegood's movements with my hands on the dual controls, and my memories of earlier helicopter flights were not so dim that I could not detect at once a difference in feel—resulting from several more years of development and design-experience and increased sensitivity, positive effect and absence of the old "helicopter shakes."

Hovering flight and normal forward flying in a helicopter seem to be two entirely different matters : the first is a new sensation and a manœuvre which a fixed-wing pilot must learn and practice; the second differs very little from flying any other sort of aircraft and the controls are used in almost exactly the same way to keep straight and level or make medium turns. Unfortunately from his point of view, the would-be helicopter pilot must learn to hover in order to land, and this may take several hours of practice. At from £20 to £60 per hour for instruction and practice, the conversion is likely to be very expensive.

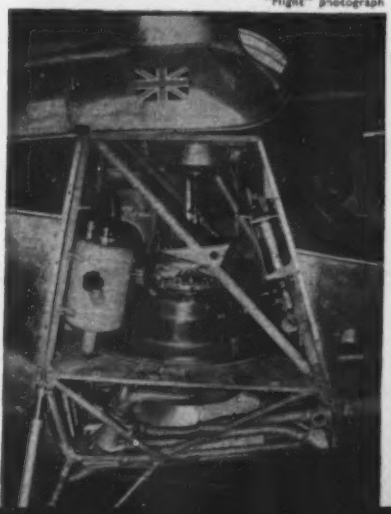
To return to the beginning again, it may be of interest to say something of the sequence of actions for starting-up and the preparations for take-off. Once the engine is running smoothly at low r.p.m. the pilot checks that the main and tail rotors are free of obstructions; then he slowly opens the hand twist-grip throttle (the collective-pitch lever is locked down) until 950 engine r.p.m. is registered. The main rotor clutch then engages automatically, and the pick-up should be checked for smoothness.

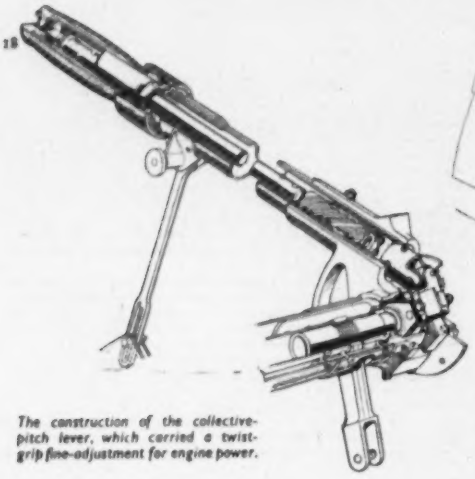
At between 1,200 and 1,500 r.p.m., when the clutch is fully engaged, a check is made for slip with the aid of rev counters and synchroscope. To avoid flapping of the rotor blades during pick-up pilots are advised to hold the stick towards the direction from which the wind is coming. It is always best to start-up facing into wind or, in a high wind, to point the nose slightly to port of wind, in order to keep the tail rotor at the maximum flapping angle. Rotor r.p.m. for warming-up are usually kept between 150 and 180, while for ground checking of engine power the Leonides is first run up to 2,680 r.p.m., giving a rotor speed of 240 r.p.m. and tested for mag drops, then to full throttle of 3,200 r.p.m. (rotor speed 287 r.p.m.)

The first action when ready for take-off is to unlock the collective-pitch lever and then to open the throttle to give approximately 270 rotor r.p.m. The wheel brakes are released and the collective-pitch lever raised (increasing pitch) until the aircraft leaves the ground. The act of raising the collective-pitch lever also increases engine power progressively; the rotor r.p.m. should remain more or less constant.

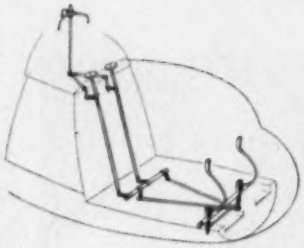
In marked contrast to the practice with fixed-wing aircraft, it is

*As clean and tidy an engine-bay as one could wish to see. The power unit is the nine-cylinder Alvis Leonides.* "Flight" photograph





*The construction of the collective-pitch lever, which carried a twist-grip fine-adjustment for engine power.*



*Simplified diagram indicating the linkage for control of cyclic pitch.*

## ABOUT BRISTOL HELICOPTERS . . .

customary on the first flight of the day to take off and then hover a few feet off the ground to check controls and instruments. The helicopter is also trimmed as soon as it leaves the ground. During the warming-up or running-up period prior to flight it is usual also to check the tilting of the rotor-tip path in relation to control-column movements and to check the functioning of the cyclic-pitch indicator.

During my brief flight experience in the 171 I took the controls for a few minutes, and, as mentioned earlier, found them lighter and more responsive than I had been led to believe. I was told that pilots accustomed to earlier types of helicopters usually tend to over-correct when they first fly the 171. Another feature which I noted was the wide range of r.p.m. available in flight. The normal limits for flying are marked as a colour sector on the indicator, and, while the pilot would usually select approximately 250 r.p.m. for flight, he can with safety allow the rotor speed to fall to as low as 200 r.p.m. in auto-rotation (or 245 with power on) or increase it to 287. A synchroscope is provided so that he may check the relationship between rotor and engine r.p.m.

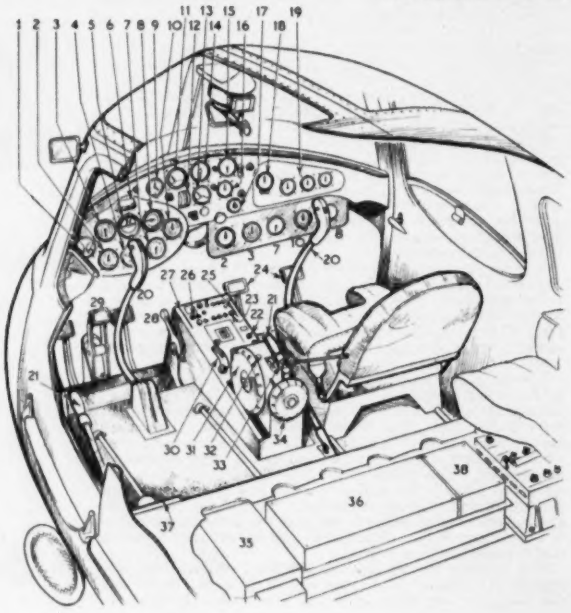
The Bristol 171 can be described as neutrally stable for normal flight; by this it is meant that, with the aid of the trimmers working on the principle of spring-loading and very sensitive in operation) and after having been set in steady flight, the aircraft will maintain its condition for 20 or 30 seconds, hands and feet off. The linkage between the control column and the rotor head is reversible, so that if any out-of-balance forces should develop they can be felt at once by the pilot through the control column. The collective-pitch lever, however, does have an irreversible mechanism, and once the lever is set for steady flight it can be left alone.

To resume the flight where we left off—hovering at a few feet off the ground—Mr. Hosegood began a climb parallel with the long runway at Filton, maintaining his rotor speed at about 270 with boost at 29in and a forward speed of about 45 kt. The aircraft is, in fact, capable of climbing at a maximum rate of about 800 ft/min up to 4,000ft. On levelling out, the boost was reduced and the rotor revs brought back to 240. The aircraft then cruised quite happily at 82 kt indicated. The flight was very smooth and, although the stick was inclined to shake, if left with hands off, this was purely a matter of its anchorage and nothing directly to do with the rotor head or the flight of the aircraft. It is not until higher speeds are approached, say, 95 or more knots, that there is any appreciable shake. Incidentally, although the 171, in common with most helicopters, readily flies sideways or backwards, it is recommended that in such circumstances the speed should be very low.

In normal cross-country flight, when the power and collective-pitch setting has been chosen, the stick becomes, in effect, the speed control; in transverse movement the response is as with

*The non-standard cockpit of G-ALSX meets the pilot's requirements for a simple blind-flying panel ahead of him, uninterrupted forward and downward view, and grouped controls between the seats. Although the instrument layout is rather different from that illustrated in the photograph, the sketch serves to indicate the standard layout of the Service Sycamore cockpit and to indicate the various controls and instruments provided.*

"Flight" photograph and Drawing




1. Oil temp. and pressure.
2. Boost pressure.
3. Tachometer.
4. D.R. compass repeater.
5. Artificial horizon.
6. Cross-level.
7. A.S.I.
8. Rate of climb.
9. Clock.
10. Altimeter.
11. Cyl. temperature.
12. Vacuum gauge.
13. Gearbox oil temp.
14. Fuel contents.
15. Fuel pressure.
16. Air pressure.
17. Ammeter.
18. Lane identification.
19. Decometers.
20. Cyclic-pitch control.
21. Throttle and collective pitch.
22. Engine starter button.
23. Clutch warning lamp.
24. Tail rotor pitch pedals.
25. Cyclic-pitch indicator.
26. Ignition switches.
27. Rotor-pitch indicator.
28. Landing-lamp lever.
29. Clutch-pump pedal.
30. Hand-brake.
31. Longitudinal bias wheel.
32. Pitch lever release button.
33. Fuel cock.
34. Lateral bias wheel.
35. STR.12 or STR.9X.
36. Decca receiver.
37. Decca control boxes.
38. Power unit.

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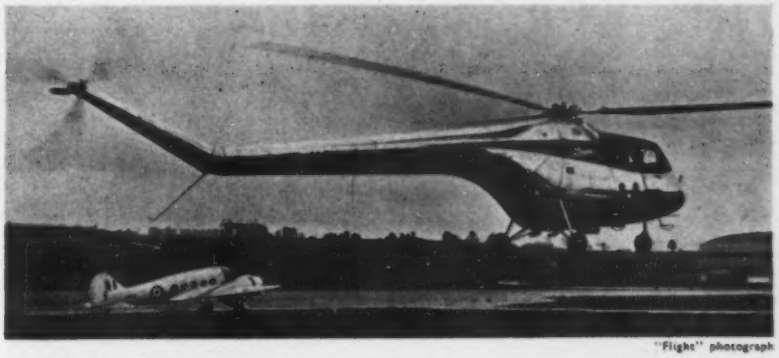


*Easing-off the Type 171 from the taxi track which runs parallel with the vast runway at Filton.*

"Flight" photograph

## ABOUT BRISTOL HELICOPTERS . . .

normal ailerons and the rudder operates quite normally. When hovering, however, the control behaves somewhat differently, because there is no forward speed or movement to direct; for example, if the stick is eased backwards or sideways the main result is, respectively, to cause the whole helicopter to move backwards or sideways and probably to start to lose height rather than to raise the nose or put on bank. An increase in engine power or a change of cyclic pitch also calls for a movement of the rudder bar to accommodate the change in torque.

One does not, perhaps, think of training flights on helicopters in terms of circuits and bumps, but, in fact, it is quite normal to take off, fly round, approach and land, in very much the same manner as on a light aircraft. The recommended approach speed, however, is between 25 and 45kt and, far from reducing the speed of the air over the lifting surfaces on the final approach, it is very important to maintain high rotor r.p.m., say, 270 to 287, prior to assuming the hovering position just above the ground. This is not only needed for good control, but it is also a precaution against engine failure; the kinetic energy in a rotor turning at high r.p.m. gives the pilot that much more time to act. Once the aircraft has touched down the collective-pitch lever is immediately moved down to the zero position, the throttle is closed, and the brake applied.

I was not shown an auto-rotative landing during this flight, weather conditions being quite unsuitable, but the action to be taken in the event of engine failure is to reduce collective pitch immediately until the blade incidence is within the auto-rotative range. The aircraft can then be glided at a rather steep angle, but with all control movements remaining normal. Depending upon the conditions, the pilot has the choice of (a) using high rate of descent and high rotor r.p.m. and arriving in the landing position with a fair amount of kinetic energy in the rotors, or (b) of using up to 4 deg of (indicated) pitch, giving a lower rate of descent and rotor speed, but less kinetic energy for the check and landing. According to the makers' instructions, in practice some sort of a combination or compromise would be employed.

The pilot is provided with a red warning lamp which operates should excessively high temperature occur in the engine compartment. If a fire breaks out in this compartment his immediate action should be to turn off fuel, stop the engine, press the fire-extinguisher button, and then make a power-off landing. At normal all-up weight the rate of descent in auto-rotation is about 1,200 ft/min with zero pitch, and the rotor reaches a figure of between 280 and 290 r.p.m.

A drill has also been worked out for ditching. Approach and hold-off procedure are normal, but all forward speed should be lost a few feet above the water and the machine dropped in on its side, slightly tail-down. It may be added here that flotation gear is under development for operation of Bristol helicopters from water or for emergency use. The floats will take the form of large-diameter inflated bags.

For many months past *Flight* has been campaigning for a wider recognition of the value of helicopters, pointing out that, while America now has many hundreds in operation (hardly a day passes without some new and valuable exploit by helicopters in Korea), Britain has, at the most, a few dozen flying with her three Services. The plans for the future, the study of operating techniques and the present production—small-scale though it is—of "the first all-British helicopter design" (which claim is justly made by the Bristol Company for the 171) are all matters for congratulation.

The consideration of the Types 171 and 173 together in this article is not inappropriate, for, while these two Bristol designs differ to a marked degree in appearance, capacity and duty, they employ virtually the same engine installations, transmissions and rotor assemblies; and thus the large amount of experience gained with the earlier 171 is to quite a considerable extent applicable to the 173. In fact, from certain points of view, it would not be misleading to regard the twin-engined machine as a development rather than a completely new and unknown aircraft.

## NATIONAL AIR RACE ARRANGEMENTS

A WEEK from today—on Friday and Saturday, July 11th and 12th—the 1952 National Air Races are due to take place at Newcastle-upon-Tyne Airport. Organized by the R.Ae.C. and sponsored by the Kemsley Flying Trust, there will be three races on the Friday evening and a fourth—the King's Cup—on the Saturday. There are 43 entries in all.

The Friday events, which will be flown separately between 6.30 and 9.30 p.m., are for the Grosvenor Challenge Cup, the Norton-Griffiths Challenge Trophy and the Kemsley Challenge Trophy; these are for aircraft in the respective international weight-categories of up to 750 kg (1,635 lb), 750-1,000 kg (1,635-2,205 lb) and over 1,000 kg.

Each event will be flown over two laps of a 32.8-mile course, a map of which was published on page 763 of *Flight* last week. All three will form eliminating contests for the following day's King's Cup Race, in which 24 competitors will participate: these pilots must be of British nationality, and no foreign competitor successful in the Friday events will be eligible for them (in any case, there are but two foreign entries).

The King's Cup Race, over four laps of the course, starts at 2.30 p.m. (or possibly 2.15—this will be confirmed later). It will be followed by what, to judge from the list, promises to be an unusually stimulating flying display. Items include individual and team aerobatics by R.C.A.F. Sabres and R.N. Attackers, a display by the famous Patrouille d'Etampes, the appearance of Prince Cantacuzene and his Jungmeister, and a demonstration of the 1917 Bristol Fighter. In all, there will be about a dozen items: three of them will have had an advance showing on the Friday evening.

Saturday admission prices are (Friday prices in parentheses): Special enclosure: car and occupants to normal capacity, £1 5s (Saturday only, bookable in advance only). Other enclosures: vehicle and passenger inclusive tickets (to normal capacity of vehicle—cars, 15s (7s 6d); motor cycles with pillion or sidecar, or three-wheelers, 7s (5s); solo motor cycles, 4s (3s); pedal cycles, 3s (2s) (adult) or 1s 6d (1s) (child under 12). Pedestrian tickets are 3s (2s), or children 1s 6d (1s). All advance booking arrangements must be made through Auto-Parks, Ltd., Maclise Road, London, W.14; Kemsley House, Newcastle-upon-Tyne, 1; or Fenwicks, Ltd., Newcastle-upon-Tyne.

It is worth noting that tickets for the Saturday also give admission on the Friday, but not *vice versa*. Extra public transport, details of which are available locally, will be laid on.

A preliminary list of entries was given in *Flight* of May 30th. A detailed list, and other information of use to intending spectators, will appear next week.

# THE AERONAUTICAL BOOKSHELF

## More U.S.A.F. History

*"The Army Air Forces in World War II, Vol. III, Europe—Argument to VE-Day." Edited by W. F. Craven and J. L. Cate. University of Chicago Press. Distributed in the U.K. by Cambridge University Press, 200 Euston Road, London N.1. Illustrated. Price 64s.*

IN the second volume of this superb history, the Historical Division of the United States Air Force admitted that war-time claims of enemy aircraft destroyed in action by American bomber crews were often hopelessly exaggerated. Official Luftwaffe records indicated, for example, that, on October 9th, 1942, when the B-17 and B-24 gunners claimed 102 German fighters destroyed and damaged, the correct score was only two. Despite the editors' warnings that much more research would be necessary before the figures could be authenticated, the new statistics were seized on by every sensationalist paper in the world, to the detriment of the Service whose early achievements in the face of extreme danger were the main theme of the book.

Now that British and American statisticians have had time to study the German figures properly, the picture is rather different. Although there were cases like the October, 1942, Lille raid referred to above, when claims were seriously wrong, experts have reached the conclusion that the A.A.F. shot down perhaps half as many German fighters as were claimed—a not unreasonable margin of error when one considers the conditions under which the original observations were made.

In this new volume we can follow the tremendous build-up of the combined bomber offensive in the last 16 months of the war in Europe, and the gradual disintegration of the Luftwaffe, *not* as a result of its losses in action or of devastated aircraft factories, but because of the drying up of its fuel supplies and the complete disruption of German transport by the bombers that it could not stop. Indeed, one of the most valuable features of this book is the first-class analysis of bombing results, which shows, for example, that "if five plants which produced ethyl fluid had been bombed out, the effect on Germany's fuel situation would probably have been catastrophic," whereas the much-publicized raids on aircraft factories and ball-bearing works were largely a waste of effort.

The unglamorous but important work of the Allied Air Forces in Italy receives full and belated publicity, as do the exploits of special squadrons which helped the Underground and those which dropped 5,997,000,000 leaflets over Europe. As usual, the narrative is scrupulously fair. Bomber Command receives much praise, and it is admitted that R.A.F. raids were often more effective than those of the U.S.A.A.F. because the British used larger bombs and more incendiaries, and remained over the target so long that the Germans could not emerge from their shelters in time to extinguish fires. We can only hope that these lessons are being studied as well by current Western strategists as they undoubtedly are in Russia.

There is much other fascinating new material in this volume, particularly in the sections dealing with the development and use of V-weapons by the enemy, and the Allied counter-offensive. We even learn that the "V" designation originally meant *Versuchmuster* (experimental type) and that its interpretation as representing *Vergeltungswaffe* (vengeance weapon) was only a later figment of Goebbels' propaganda machine. It is equally surprising to learn that Field Marshal von Fritsch saw a demonstration of a V.2 prototype as early as 1934, and that "by 1939 more than one-third of Germany's entire aerodynamic and technological research was devoted to the hope of creating missiles capable of bombarding New York"—a fact of which British intelligence was aware in November, 1939.

It is sobering and a little frightening to recall that the Germans had operational V.2s, air-to-air guided missiles, rocket-powered fighters and the still-mysterious V.3 seven years ago, and then to study our present deficiencies. This is, in fact, a book which no student of air warfare can afford not to read.

## Spotters' Joy

*"The A.B.C. of Military Aircraft" and "The A.B.C. of Civil Aircraft Markings," both by J. W. R. Taylor. Ian Allen, Ltd., 282, Vauxhall Bridge Road, London, S.W.1. Both priced at 2s 6d.*

*"The Airport Visitor," edited by N. J. Freeman and G. D. H. Linton. Penman Enterprises, Ltd., 202, Cheam Common Road, Worcester Park, Surrey. Price 2s (2s 3d by post from publishers).*

NOT long ago there was a shortage of really up-to-date books on aircraft recognition, but now a fair crop of brightly covered manuals has blossomed on the bookstalls. This business of observing aircraft has become very specialized, as witness the diverse contents and layouts of the different books on the subject. Notes on three such publications appeared in *Flight* of April 11th; now the reviewer is faced with another trio.

*Military Aircraft*, one of the "A.B.C." series, has been compiled by John W. R. Taylor, whose work will be familiar to most readers. Essential information is given, in 70-odd pages on art paper, of over 80 British, American and Canadian service types likely to be seen in or over this country (later books will cover other military aircraft). Each machine is illustrated by at least one photograph and—in most cases—by three-view silhouettes. Both the price (*2s 6d*) and the handy size of this book are well suited to the average pocket.

*Civil Aircraft Markings*, another A.B.C. book by John Taylor, is an illustrated guide to the ownership of every aircraft on the British Civil Register and most of the overseas airliners serving Great Britain. To give an idea of the value of the book to the enthusiast we quote here two contrasting references (actually the first and the last in the lists): G-EBLV—D.H.60 Moth owned by de Havilland Aircraft Co.; 4X-AQE—Curtiss C-46 operated by El Al (Israel Airlines). Useful also are the specification-table of civil types and facsimiles of company insignia.

*The Airport Visitor*, very good value at two shillings, is a booklet published with M.C.A. approval mainly as a "programme" to be sold at aerodrome public enclosures. Previous editions have introduced to thousands of airport-goers the intricacies of civil aviation. In latest form, edited by N. J. Freeman and G. D. H. Linton, it includes an index to airliner registrations, photographs and Wren drawings of transports, and explanatory contributed articles on such topics as ground aids, helicopters, the R.O.C., the Aircraft Recognition Society and Air Britain. There are also full details of British airports and descriptions of airliners. Air Marshal Sir John D'Albiac contributes an introduction.

## Supersonics

*"High-Speed Aerodynamics," by W. F. Hilton. Longmans, Green and Co., Clifford Street, London W.1. Price 60s.*

THE higher aircraft speeds made possible by the advent of the gas turbine have rendered the study of high-speed aerodynamics of paramount importance, to say nothing of the interest aroused by the war-time use of guided missiles. The answers to many questions bound up in this subject are to be found in Dr. Hilton's comprehensive book, which should appeal to the student as well as to the research worker. Emphasis is laid on the clear explanation of the physical principles underlying transonic and supersonic airflow, and is followed by mathematical analysis where necessary. With some excellent photographs of the shock-waves which are characteristic of supersonic motion, many other illustrations and separate author and subject indices, *High-Speed Aerodynamics* should be a most valuable work of reference.

## OTHER BOOKS RECEIVED

*Die Gasturbine*, by J. Kruschik. Springer-Verlag, Molkerbastei 5, Wien 1. Price £5 7s.

*Stuka Pilot*, by Hans U. Rudel. Euphorion Books, 302, Vauxhall Bridge Road, Victoria, London, S.W.1. Price 12s 6d.

*The Stories of Flying Officer "X,"* by H. E. Bates. Jonathan Cape, Ltd., 30, Bedford Square, London, W.C.1. Price 10s 6d.

*Night be my Witness*, by Walter Clapham. Jonathan Cape, Ltd., 30, Bedford Square, London, W.C.1. Price 12s 6d.

*Faith is a Windsock*, by Miles Tripp. Peter Davies, Ltd., 38, Bedford Square, London, W.C.1. Price 12s 6d.

*Modern Electrical Contracting: Business Organization and Routine*, by H. R. Taunton. Published for *Electrical Review* by Iliffe and Sons, Ltd., Dorset House, Stamford Street, London, S.E.1. Price 10s 6d.

*Air-plane Flight*, by A. York Bramble. Sir Isaac Pitman and Sons, Ltd., Pitman House, Parker Street, Kingsway, London, W.C.2. Price 35s.

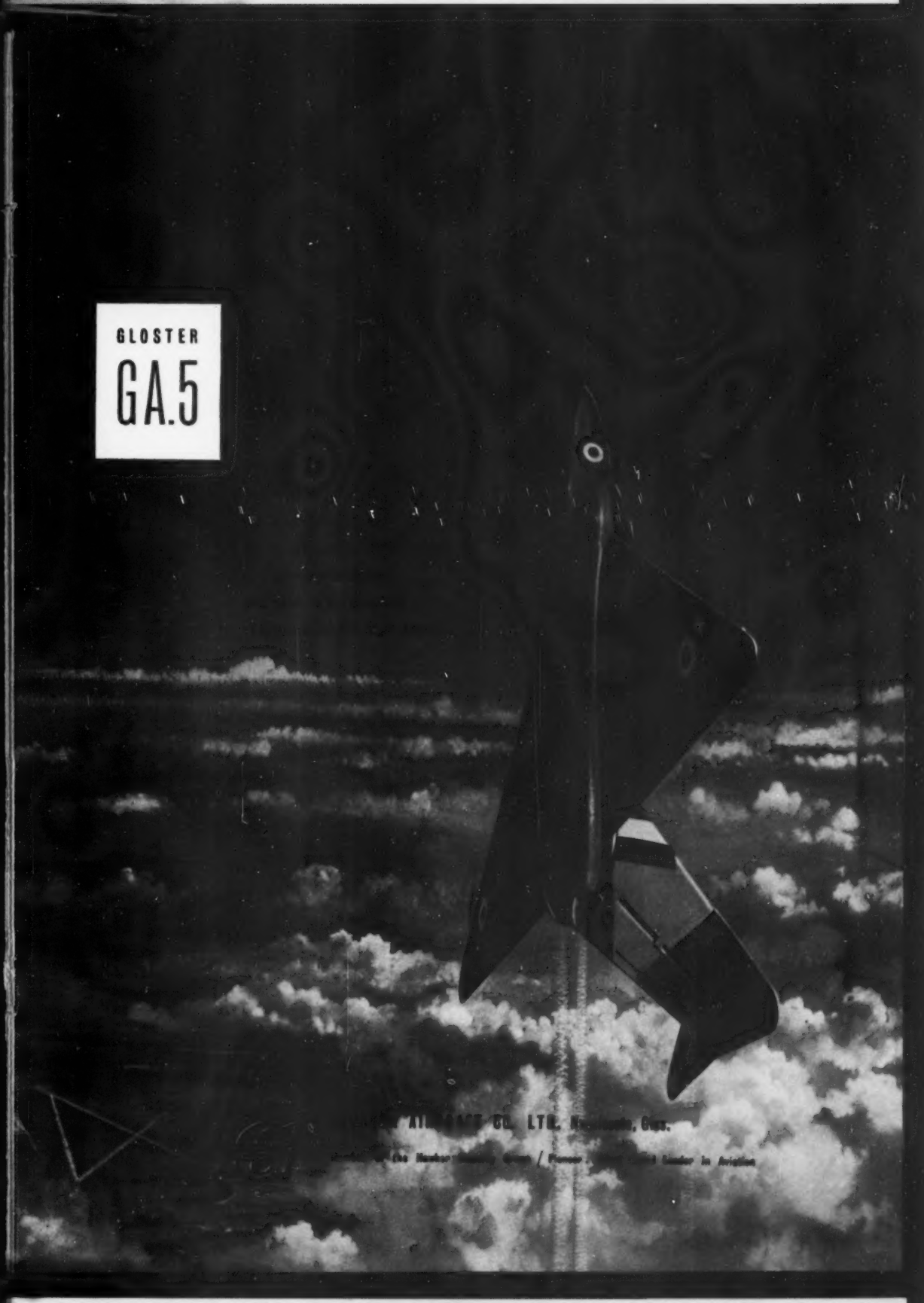
*The Principles of the Control and Stability of Aircraft*, by W. J. Duncan. Cambridge University Press, Bentley House, 200, Euston Road, London, N.W.1. Price 40s.

*Ace Book of Speed*, by Roland Davies. Odhams Press, Ltd., 95, Long Acre, London, W.C.2. Price 3s.

*Blue Guide to Switzerland*, edited by L. R. Muirhead. Ernest Benn, Ltd., Bouverie House, Fleet Street, London, E.C.4. Price 30s.

*Two Eggs on my Plate*, by Oluf Reed Olsen. George Allen and Unwin, Ltd., Ruskin House, 40 Museum Street, London, W.C.1. Price 15s.

*Air Navigation Theory and Practice*, by E. Brook Williams and W. J. V. Branch. Sir Isaac Pitman and Sons, Ltd., Pitman House, Parker Street, Kingsway, London, W.C.2. Price 55s.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GA.5

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*Vic Smeed, winner of the Queen Elizabeth Cup, is a 29-year-old timber-yard manager; he has spent much time in the R.A.F. (Right) This view of the Epsom club getting settled in was typical of hundreds of similar groups at Langley last Sunday.*

"Flight" photographs

# MODEL DAY at LANGLEY

## *Annual Northern Heights Gala at the Hawker Airfield*

NOT even the relentless sun of last Sunday, June 29th, could impair the activity of the 20,000-odd model aircraft enthusiasts who, by the kind permission of the directors of the Hawker Aircraft Company, once again spread themselves evenly over the airfield at Langley, Buckinghamshire, throughout the day.

The occasion was the fifteenth annual meeting of the Northern Heights Model Flying Club, at which the Queen Elizabeth Cup, and several other trophies, are competed for. This year the club came of age, and great indeed are the advances in models that have been made since 1931.

It is so much easier to experiment with models than with full-scale aircraft that it is not surprising to find a variety of (to the uninitiated) strange shapes at such a gathering, including fixed-wing models of all possible forms, rotary-wing designs, all-wing machines and some with no wings at all—lift being produced by inclining the airscrew axes. It must have shaken the Hawker test pilots Neville Duke and Frank Murphy, who were present, to find the Langley sky housing such unfamiliar forms.

As in previous years, the Queen's Cup was the principal event, this trophy being now known as the Queen Elizabeth Cup, Queen Elizabeth the Queen Mother being the donor. This is open to power models of up to 5 c.c. capacity, the marks for duration being augmented by a bonus awarded for all landings made within a prescribed area. The winner was Vic Smeed, a well-known modeller from the Canterbury Pilgrims Club. He gained a bonus on each flight and his aggregate time of 4 min 51.5 sec (for three flights with a maximum of 15 secs under power on each) beat by ten seconds Mr. J. Lewis, of the Northern Heights Club. The cup was presented to Mr. Smeed by Lady Boyce, the Lady Mayoress of London, who spent much time at Langley last Sunday and found the proceedings of absorbing interest.

The *Flight* Trophy, an open duration contest for gliders, was won by E. Wallace, of the Surbiton club, with two flights totalling 523 sec. Second was I. Wheatley (Sutton By-passers) with 402.75 sec. The corresponding trophy for rubber-driven models, the Fairey Cup, was won by E. Bennett (Croydon) with an aggregate time of 566 sec for his two flights. He was followed by R. Atkinson (Ipswich) with 515 sec and P. Allaker (Surbiton), who clocked 504.2.

The Thurston Helicopter Trophy—donated by Dr. A. P. Thurston, president of Northern Heights—was won by M. Ingram (Jetex), with P. Bashford and V. King (both of Pharos Club) second and third. An impressive collection of helicopters was gathered for this event, employing both shaft- and tip-drive. The de Havilland Trophy, for power models, was taken by J. Swaniways (W. Middlesex) with 430 sec; N. J. Marcus (Croydon) and F. Chatwin (Birmingham) were runners-up, with 384 and 352 sec.

Noisiest event was the control-line team racing, for which two trophies can be competed. Class A (up to 2.5 c.c.) qualifies for the Coronation Cup, won by H. W. Langston (High Wycombe) at 50.5 m.p.h.; B. Jones (Bristol) and Wiltshire (Slough) also being placed. Class B (2.5 to 5 c.c.) compete for the "Model Engineer" Cup, awarded to W. Morley (W. Essex) at 66 m.p.h., the second and third finishers being Wright (St. Albans) and C. Taylor (W. Essex).

The R.A.F. Review Cup, awarded to the winner of the radio-controlled spot-landing contest, went to R. C. Lawyer (W. Middlesex) at 13 yd; near winners were S. Collins (N. Heights), 19 yd, and F. Sutherland (W. Essex), 21 yd. Finally, the winners of the popular Concours d'Elegance were: power, Tipper (Gosport); general flying, Nachtmann (Polish A.F.A.); flying scale, Ploszajski (P.A.F.A.); and unorthodox, Manuel (St. Georges Heights)—with a radio-controlled glider.

Entries for the eight contests totalled considerably more than 500, and even this figure is but a small fraction of the models present. What a good thing it is that Langley can be made available for this popular event; the Northern Heights club and the Hawker company are undoubtedly filling a real need in promoting this annual gathering—a policy which may reap a rich harvest of practical aerodynamicists in the years to come.

## MIDSUMMER DANCE AT HATFIELD

IN a fairyland setting, graced by perfect weather, the de Havilland Aeronautical Technical School and their Old Boys' Association, in conjunction with the London Aeroplane Club, held their annual midsummer dance at the Aerodrome Restaurant, Hatfield, on Friday, June 27th.

The D.H. Cirrus Moth, G-EBLV, was parked beside the equally aged 3-litre short-chassis Red Label Bentley, and together with numerous photographs of D.H.'s and the London Aeroplane Club's pre-war activities lent an air of nostalgia to the evening. The swimming pool, cabaret and firework display provided attractive diversions when dancing proved a little too warm.

Organized along the lines of D.H.'s previous midsummer dances, this particular event proved even more popular than in previous years, and the weeks of hard work which the organizers had spent was well rewarded by the record attendance and undoubted success of the evening.

# SERVICE AVIATION

*Royal Air Force and Naval Aviation News*

*ONE OF SEVENTEEN Auster Aiglet trainers ordered by the Pakistan Government for the Royal Pakistan Air Force and now coming off the production line at Rearsby. Of the 17, eight will be camouflaged and fitted out for A.O.P. duties and the remainder will be supplied as trainers, with an appropriate yellow finish. Note, in this view, the ventral fuel tank.*

### Senior Appointment

IT is announced by the Air Ministry that Air Marshal Sir John Whitworth Jones, K.C.B., C.B.E., will take up the appointment of Air Member for Supply and Organization on September 1st. He will take the place on the Air Council at present held by Air Chief Marshal Sir William Dickson, who is to become Chief of the Air Staff on January 1st next year.

### Command Appointments

THE Queen has approved the appointments of Air Marshal Sir Thomas M. Williams to be the A.O.C-in-C. Home Command, from September 30th, and of A. V-M. L. F. Pendred to be A.O.C-in-C. Flying Training Command, from August 1st, with the acting rank of Air Marshal.

Sir Thomas has been Inspector-General of the R.A.F. for the past year and was designated A.O.C-in-C. Far East Air Force, but was unable to take up this appointment owing to ill health.

For the past two and a half years A. V-M. Pendred has been Commandant of the School of Land/Air Warfare, at Old Sarum, and previously was Assistant C.A.S. (Intelligence).

### R.A.A.F. Appointments

IT has been announced that G/C. A. M. Murdoch, C.B.E., is to be Officer Commanding Point Cook and Commandant of the R.A.A.F. College. The previous commandant, G/C. M. O. Watson, changes posts with G/C. Murdoch by becoming Director of Air Staff Plans and Policy at R.A.A.F. headquarters. Both served with he Royal Air Force during the war.

### Scone Trophy

BY scoring a total of 420 points out of a possible 600, Edinburgh University Air Squadron became the winners of the Scone Trophy. Glasgow University, the holders, were beaten by 15 points, and St. Andrews and Aberdeen shared third place with equal points.

Cdt. Plt. G. Buchan, a fifth-year medical student at Aberdeen University, gained the highest individual score in the aerobatic event by obtaining 92 points out of a possible 100.

Air Chief Marshal Sir Brian E. Baker presented the trophy to S/L. J. R. C. H. Graves, who commands the Edinburgh Squadron.

The Scone Trophy was presented by Airwork Ltd.—who maintain the aircraft of the Scottish University Air Squadrons—in 1951. General flying, navigation, formation, drill and aerobatics are all subjects for competition.

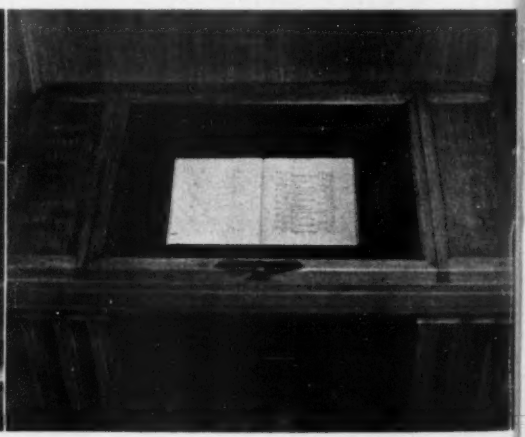
### R.N.V.R.s in Malta

THE first of the Royal Naval Volunteer Reserve squadrons to complete its annual training overseas this year is No. 1831, stationed at R.N.A.S. Stretton, near Warrington. The inspired Admiralty notion to send the unit to Malta, G.C., was attended with remarkable success in more ways than one.

Led by their C.O., Lt.-Cdr. R. I. Gilchrist, M.B.E., R.N.V.R., the squadron took off from Stretton in 11 Sea Furies at 0730 hr on May 16th in perfect weather. Having landed at Lee-on-Solent for met. reports, re-briefing and Customs clearance, they crossed the French coast at Le Havre and, in close formation, steered a course for Vichy, lowering themselves down from 8,000ft along the Rhône Valley and arriving at Hyères (Toulon) in time for lunch with the French Navy. Whilst this pleasant function was in progress the aircraft were being refuelled and checked by a maintenance party, specially flown out by Expediter from Lee-on-Solent. A broken oil pipe was discovered in Lt. "Phil" Blakey's machine and he was left behind to enjoy some more French Naval hospitality. The remaining 10 Furies set off at 1600 hr, made a perfect sea crossing via Corsica, Sardinia and the Sicilian coast, landing at Hal Far, Malta, at 1850 hr. Spare pilots, maintenance officers and ratings—80 strong—had arrived in Vikings before tea-time on May 17th.

Hal Far is a Royal Naval Air Station and accordingly bears a ship's name—H.M.S. *Falcon*; so it was considered a tactful move by "1831" to throw a mid-day cocktail party

*CRANWELL MEMORIAL: (Left) The interior of the Royal Air Force College memorial chapel, which was dedicated by the Bishop of Lincoln. The pew ends bear the badges of the Commands. (Right) The Roll of Honour, bearing the names of 477 former cadets who lost their lives in the Service, is contained in a glass-topped case in an alcove at the end of the chapel farthest from the altar.*



## SERVICE AVIATION . . .

on the following day (Sunday) for all the station officers and their ladies. Despite the severe blow thereby dealt to the squadron's welfare fund, it was reckoned to have been well worth-while, and all other V.R. squadrons which go out are recommended to follow the same procedure. Meanwhile a spare had been flown back to Hyères and Lt. Blakey brought in his Sea Fury, thereby enabling the complete squadron to commence training at once.

Full advantage was taken of the twelve days of perfect flying weather which followed. Especially remarkable was the standard of air-to-air and air-to-ground firing, which brought the personal congratulations of the C.-in-C. Mediterranean, Admiral the Earl Mountbatten of Burma. The maintenance crews, in tropical rig (mostly stripped to the waist), toiled away in a wholly different atmosphere from the murk and industrial haze which is their usual environment. Serviceability was as near 100 per cent as it ever could be, and the result was an aggregate of between 400 and 500 hours' flying in ten days—easily the most concentrated period since the squadron formed up some five years ago. Towards the end they were fully worked up to operational standard.

The flight home was a perfect one, low cloud and drizzle in Northern France and Southern England notwithstanding. There were no "lame ducks" and the formation was dead on all its E.T.A.s from Malta to Stretton.

Since returning to their parent station all members of the squadron have been delighted to hear of Lt.-Cdr. Gilchrist's award of an M.B.E. in the first Birthday Honours conferred by Her Majesty the Queen.

### R.A.F.A. Conference

THE Royal Air Forces Association has decided to join the World Veterans' Federation. This decision was made at the recent annual conference at Douglas, Isle of Man, on a card vote of 34,551 to 15,100. A resolution that the conference "having heard a full report on the objects and activities of the World Veterans' Federation declares its support and decides that the Association accepts an invitation to membership," was sponsored by the National Council, and G/C. R. C. Vaughan, chairman of the Executive Committee, stated they had received a communication from the Under Secretary for Foreign Affairs that the Federation was an organization worthy of support and free from Communist infiltration.

A resolution calling for compensation from the Japanese for ex-P.o.W.s received the unanimous support of the delegates. It was moved by Mr. H. J. Parker (Liverpool Central branch), who referred to the "unbelievable brutality and inhuman treatment" suffered by 50,000 British service men, and said the 38,000 survivors were merely asking for 3s. a day for the period of their captivity, the equivalent of the food denied them by the Japanese in defiance of the Geneva Convention. This would mean only nine million pounds. In the United States each ex-serviceman had already received £300; in Australia, each was to receive almost £70; in Britain a man would be lucky if he got £25.

The conference also adopted a resolution urging the National Council to continue its efforts to obtain a further increase in pensions, bearing in mind the Minister of Pensions' statement in the House of Commons in February that about 62s. was now required to produce the purchasing power of 45s. in 1946. In moving the resolution, Mr. H. R. Taylor said that figure was now nearer 70s., and in seconding, Mr. H. Simms said the lot of the disabled man, who was in some light job at a low wage, was a particularly hard one at the present time. They should strive for an increase in pensions and allowances now while the memory of sacrifice was still green, and not wait until real hardship existed. He remarked that the basic pension was 40s. in 1919, and now it was only 55s., an increase of 22 per cent., while M.P.s' salaries had risen from £400 to £1,000, an increase of 150 per cent.

Mr. M. A. Liddell said the Association realized their claims could not be pushed to the detriment of the country, but they were concerned about the level of the disability pensions. They had received an increase of 10s. although they realized that was not sufficient, and they looked forward to the Government bringing pensions into line with the present-day cost of living.

The Conference also adopted a resolution that the pensions of other ranks should be brought more into line with those of officers, in conformity with schemes operating in the Dominions and other countries. A resolution that it should be possible to appeal against a decision of the Pensions Appeal Tribunal was defeated.

At the opening of the conference delegates were officially welcomed by the Lieut-Governor of the Island, A. V-M. Sir Geoffrey Bromet (president of the North-West Area), and the Mayor of Douglas, Councillor J. A. Cain.

*IN THE ISLE OF MAN: A. V-M. Sir Geoffrey Bromet, Lieutenant-Governor of the Isle of Man and president of the north-west area of the R.A.F.A., opening the annual conference of the Royal Air Forces Association at Douglas. On his left are Air Marshal Sir Richard Peck, chairman of the conference; the Mayor of Douglas, Councillor J. A. Cain, J.P., and the Rev. J. Moorhouse, who conducted the Silent Tribute.*

*DROGUE ADDICT: All that was left of the drogue when Lt. "Ken" Tickle, R.N.V.R., of No. 1831 Squadron, had finished practising with the Hispanos of his Sea Fury during the squadron's annual training in Malta (see "R.N.V.R.s in Malta," page 22). Lt. Tickle is seen with the remnants of the drogue draped around him, while Lt. H. Burman, R.N., the C.F.I., gives support.*

## SERVICE AVIATION . . .

### High-speed Operations Rooms

IT is reported that some of the 40 large war-time-built destroyers scheduled for reconstruction will form a new class of fast aircraft-director ships. The class is planned to relieve aircraft carriers and the heavy fighting ships from the burden of staffing and operating the complicated apparatus employed today in modern fighter direction.

The ships chosen for this purpose will have their main armament removed and will carry only anti-aircraft and anti-submarine weapons. In place of the gun turrets will be built the necessary aerial systems and director towers. Except for their own defence the ships will be free from all fighting responsibilities and will devote their whole energies to the handling of aircraft in attack and defence.

### Flying Training Command Party

ON Saturday afternoon last, the A.O.C.-in-C. and Officers of Flying Training Command H.Q. held a garden party at Shinfield Park, Reading.

Air Marshal Sir Hugh Walmsley and Lady Walmsley received their guests on the lawn at the rear of the officers' mess. The function was a brilliant one, both in the matter of weather and guests. The present Chief of the Air Staff, Sir John Slessor, attended, and at Sir Hugh's table for tea were Marshal of the Royal Air Force Lord Trenchard and Lady Trenchard. To entertain the gathering there was a cricket match between the officers of Flying Training Command and A. V-M. Sharp's XI, some high-quality tennis matches on the hard courts, and the R.A.F. Central Band was in attendance.

### Exercise "Castanets"

DURING part of the final phases of "Castanets" (the opening of which was dealt with last week) intermittent rain and low visibility gave the submarines greater freedom of action, and successes were claimed. The most important of these was by the Dutch submarine *Zwaardvis*, which claimed the sinking of the *Queen Elizabeth* about 130 miles west of the Scillies. Another Dutch submarine, the O-27, launched an attack against the British frigate *Hedingham Castle*, which was escorting a French convoy.

On the night of June 21st, H.M.S. *Apollo* (acting as an enemy raider) in company with *Opportune* was sighted off Den Helder, and air-shadowed. A striking force of Firebrands from No. 813 Squadron R.N. took off from a base in Norfolk, but bad weather at base caused the operation to be cancelled when the Firebrands were within 30 miles of their target. The chase was taken up by destroyers in the vicinity.

At the same time an important troop convoy going north up the east coast was the target for strong air opposition. Firebrands attacked the ships as they passed the Wash, but they themselves were prevented from pressing home the attack by Meteor 8s of Fighter Command scrambled from bases in East Anglia. A Mosquito of No. 771 Squadron R.N. launched rocket attacks against the convoy, but was intercepted by two Vampires.

Another convoy, on passage from Portsmouth to Milford Haven, was attacked by 24 rocket aircraft from R.N. stations in Cornwall. They were opposed by eight Meteors on patrol over the convoy.

The bad weather at this period shut down a number of air bases in the United Kingdom, but one Coastal Command aircraft flying from a French base under the control of the French Maritime H.Q. at Brest, was able to operate in the south-western approaches.

Another phase of the exercise was the anti-aircraft defence practice which was held by ships in harbour co-operating with shore defences in repelling attacks by "Red" aircraft from H.M.S. *Illustrious*.

By Monday, June 23rd, the principal operational areas in the exercise had narrowed down to the Atlantic approaches to the Channel, and the North Sea. Coastal Command was again in operation with Sunderlands from Pembroke Dock and Shackletons and Canadian Lancasters from St. Eval in Cornwall. At St. Eval, also, were some Skyraiders from the Royal Canadian Navy which had been flying in intensive operations from the Canadian carrier *Magnificent*.

There was considerable submarine and air activity off the east coast of Scotland, where a troop convoy was on passage for Norway. In the convoy were the fighter direction ship *Boxer*, *Indefatigable*, *Implacable* and the R.A.F. ship *Bridport*. The Dutch carrier *Karel Doorman* was part of the anti-air and anti-submarine force protecting the convoy.

In connection with the work of the Shackletons, Air Marshal Sir Alick Stevens spoke of their reliability. From the flying standpoint this was undoubtedly true, but considerable unserviceability was experienced with the ancilliary equipment. On one sortie from St. Eval, with a *Flight* representative on board, the Gee instrument had to be changed before take-off. Later in the flight the replacement Gee failed, as did the A.P.I. and the G.P.I., and when the A.S.V. failed to record the Scilly Isles immediately below the aircraft, the Shackleton was ordered to return to base.

"Flight" photograph

*GARDEN PARTY: Air Marshal Sir Hugh Walmsley and Lady Walmsley receiving guests on the lawn at the Flying Training Command H.Q. (see this page).*

Fortunately the R/T was still functioning for a G.C.A. landing at St. Eval.

Subsidiary exercises held on the Tuesday included mine-laying by Bomber Command Lincolns in special areas to give the new Mine Watching Service some practice.

On the last day of "Castanets" (the exercise was called-off 10 hours earlier than the scheduled time) the enemy raider *Apollo* again was the centre of the picture. She and her accompanying ship *Ulster* were both found by Coastal Command Lancasters and shadowed until surface forces were brought in to deliver a successful attack. It had become evident that these raiders had intended attacking the troop convoy returning from Scandinavia, and a *Tirpitz* and *Prinz Eugen* battle was fought north-east of Aberdeen.

Strike aircraft from the *Karel Doorman* caused some damage to the *Apollo*, enabling the *Swiftsure* to get within gunfire range. Destroyers were then sent in to finish the raider off. *Ulster*, however, escaped and contact was lost. Later the *Ulster* made a long-range attack on the convoy and was "sunk" for her temerity.

The climax of the operation was to have been an amphibious attack on Den Helder, but the attack having been detected and foiled by "Blue" naval and air forces the exercises were brought to a close.

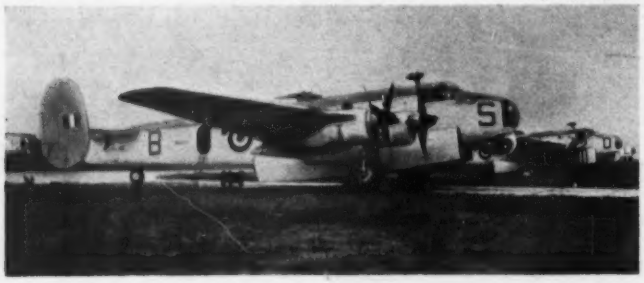
Sir Alick Stevens, speaking at a conference after "Castanets" had finished, said that maritime aircraft had flown 162 sorties, totalling 1,575 hours. A total of 51 submarines had been sighted and 34 attacked.

### Exercise "Beehive"

AIR/NAVAL exercises in the Mediterranean, under the code name of "Beehive II," took place on June 19th to 21st. A narrative of the exercises will be published next week.

*LONG-RANGE SUB-SEEKERS: Shackletons, normally stationed at Gibraltar, waiting on the tarmac at St. Eval during "Castanets." The close "dispersal" lent an air of unreality to the scene.*

"Flight" photograph



*HUNTING IN AFRICA: Pictured on the inaugural Safari service is a Viking of Hunting Air Transport—flying over the Libyan Desert on the El Adem/Wadi Halfa sector of the London-Nairobi route. The African sun is brilliantly reflected by the Viking's unpainted cabin-top.*

# CIVIL AVIATION

## NEW WAY TO AFRICA

ILLUSTRATIONS on this page show two aspects of the new Safari service between London and Nairobi, recently inaugurated by Airwork, Ltd., and Hunting Air Transport, Ltd. Operated alternately by Airwork, from Blackbushe, and Hunting, from Bovingdon, the services leave London on Saturdays and arrive in Nairobi on Mondays. The return schedule is Wednesday-Friday. Single fare is £98 and a return ticket costs £180, compared with the B.O.A.C. fares of £140 and £252. We hope to publish some personal impressions of a Safari journey in the next issue.

## CONSUL ACCIDENT INQUEST

AT an inquest on the pilot and five passengers who died when a chartered Consul "ditched" in the English Channel on June 14th, one of the two survivors, Mr. B. H. Bowring, said that the starboard engine began to "cough and splutter" over Brighton; it seemed to clear up, but 35-40 minutes later the engine gave more trouble. Mr. Bowring gathered that the pilot had then decided to return to Croydon; they gradually lost height, the engine finally stalled and the aircraft hit the water at about 120 m.p.h. The inquest was adjourned until September 30th.

## B.E.A. NEWS

MOST of B.E.A.'s Scottish-route Rapides will soon be replaced by Pionairs, and re-scheduling is now in progress to take full advantage of the latter type's improved navigation aids. With the prospect of a large increase, next April, in the number of cheap-fare services on European routes, the Corporation is making plans to increase the seating-capacity of its fleet as much as possible. The first "Tourist Viking" was recently delivered to Northolt and will soon be ready for service. The number of seats can be varied between the standard 27 and a maximum of 38.

B.E.A.'s chief executive, Mr. Peter Masefield, flew to Cyprus and back recently in Elizabethan *Earl of Leicester* on the inaugural service from London. The round trip, covering some 4,350 miles, took 18½ hr. Mr. Masefield spent most of the outward flight dictating 10,000 words of the forthcoming annual report (his secretary, it is said, kept up the high rate of utilization by typing them out before the end of the journey).

## AIR-INDIAN DOLDRUMS

AT the annual meeting of Air-India, Ltd., Mr. J. R. D. Tata, chairman, stated that the airline made no progress last year. Unlike the majority of scheduled airlines, for whom 1951 was a year of all-round expansion, Air-India "lost ground in all aspects of its operations except in the tonnage of mails carried, while its gross revenues were the lowest of the last four years." Mr. Tata blamed excessive Governmental control of operations for this decline.

Remarking that the "progress of individual companies thus depends no longer on their own efforts, but on the working in each case of the policies and controls of the Ministry of Communications," he compared the 1948 operating statistics of the three leading Indian airlines with the figures for 1951: Air-India carried 119,000 passengers in 1948, but only 105,000 last year, whereas Deccan Airways' passengers rose from 27,000 to nearly 50,000 and the Airways (India) total of 17,500 soared to 111,000 in the same three-year period. Mr. Tata also noted that Airways (India), now the largest operator in the country, has exceeded the level "painstakingly reached by Air-India in 20 years." He welcomed the assurance of the D.G.C.A. that there has been no deliberate discrimination against Air-India, but stated that the company's position is no less unfair and demanded that the Indian Government should make an immediate decision of policy: "If they wish to nationalize the industry, let them take it over now on fair terms."

On December 31st, 1951, the end of the period covered in the Air-India annual report, the company's fleet consisted of 11 Dakotas, seven Vikings and a DC-4. Statistics for the year's operations included the following (1950 figures in parentheses): miles flown, 4,395,000 (5,588,000); passengers carried, 108,000 (115,000); capacity ton-miles flown, 10,489,000 (13,049,000); passenger-miles flown, 65,441,000 (66,202,000); freight carried, 6,358,000 lb (24,194,000 lb); mail carried, 1,775,000 lb (1,571,000 lb).

The year's operations resulted in a loss of nearly £40,000; revenue totalled Rs 21,330,879 (approximately £1,600,000) and expenses were Rs 21,844,339 (£1,640,000). In 1950, revenue and expenses were approximately equal. The fuel shortage, which reduced services during the later half of 1951, following the Abadan shut-down, was largely responsible for the decline in revenue.

Better results were shown during 1951 by Air-India International, Ltd., of which Air-India owns 51 per cent of the shares. This company, which operates four Constellations, flew 14,103,000 capacity ton-miles last year—3,200,000 more than in 1950.

## ADEN AIRWAYS IN 1951

IN the June 20th issue of *Flight* were depicted some of the activities of Aden Airways, a wholly-owned B.O.A.C. subsidiary which operates six DC-3s over a 6,000-mile network in the Red Sea area. Further information on the company's activities during the year ended March 31st can now be added as a postscript. The

*AFRICAN FLAGSTOP: Airwork's Viking at Entebbe, Uganda, on the inaugural Safari service. Entebbe is a flagstop on both the Airwork and Hunting services between the United Kingdom and Kenya. Services by both companies call at Nice, Malta, El Adem, Wadi Halfa, Khartoum and Juba.*

## CIVIL AVIATION . . .

company records that, despite increases in costs and competition, a gross profit of £21,215 was made and that after deductions a net balance of £2,911 has been carried forward to this year's account. Total operating revenue was nearly £492,000, of which scheduled services accounted for over £408,000. Annual fleet utilization was 1,319 hr per aircraft and the average load-factor over the year was 70.5 per cent. Demands for charters showed an increase during the year, and special pilgrim flights to and from Mecca also made a substantial contribution to revenue.

### STRETCHING THE BRISTOL FREIGHTER

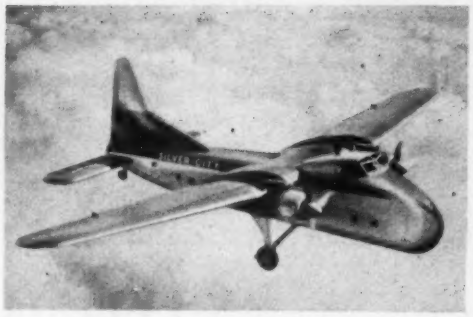
THE designation Bristol 170 Mk 32 has been applied to the new long-nosed type of Freighter ordered by Silver City Airways for their car-ferry services. It is learned that the needs of the super-priority programme have delayed construction of the first machine, which is not now expected to be ready in time for the S.B.A.C. display. The operators hope, however, that all six will be delivered in time for introduction on cross-channel routes next spring. The Mk 32 will have an overall length of 73ft 6in, the increase on standard fuselage length being 5ft 2in (4in more than was initially announced last week). The length of the hold has been increased from 31ft 8in to 37ft 6in, and an extra 4ft 9in can be gained by moving back the forward bulkhead of the passenger compartment—enabling the freighter to carry three cars of 14ft length or two of the largest American makes. At present costs and fares, S.C.A. expect to receive 33 per cent more revenue per hour from the new Freighters than from those now in use.

### INDIA-PAKISTAN DISPUTE

DELEGATES of Belgium, Brazil and Canada have been appointed by the I.C.A.O. council to consider charges made by India against Pakistan, to the effect that the latter is discriminating against Indian civil air transport.

India wishes to run commercial services between New Delhi and Kabul, Afghanistan. The direct route between these two points is only 642 miles, but as civil aircraft are prohibited from flying over the entire Western boundary of West Pakistan, the Indian aircraft would have to take an indirect route of some 1,900 miles via Karachi and through Iran. The Indian Government complains that the extent and location of the prohibited area are not reasonable; it points out that an Iranian airline runs a scheduled service across the area and "reluctantly concludes" that the real intention of the Pakistan Government is to prevent easy communication between India and Afghanistan.

In reply, a Pakistan note states that the existing prohibited areas are exactly those which have existed in undivided India since 1935. Iranian Airways have been permitted to fly over the area between Zahidan and Karachi because the inhabitants of the tribal area might reasonably be considered to be friendly in the event of a forced landing, but the tribal people, states the Pakistan note, are definitely unfriendly to India because of the Indian attitude over the Kashmir and the Pushtoonistan issue . . . "The tribesmen are all armed and there are reasons to believe that they take delight in having snap shots at the flying aircraft." The note adds that a similar prohibition was extended to K.L.M., even though there are no special reasons for the tribesmen to be unfriendly towards the Dutch. The Indian application, it concludes, should be rejected in the interests of the safety of passengers and crew.



*FIRST IMPRESSION of the new Mk 32 Bristol Freighter as it will appear in the livery of Silver City Airways, who have ordered six for service on their cross-Channel ferry routes (subject of an article in last week's issue of "Flight"). Externally, the Mk 32 is distinguished by the new fin configuration and considerably modified nose. Further details are given in the adjacent paragraph.*

*LONDON UNDERGROUND: Now under construction at London Airport is a 2,000ft × 80ft vehicle subway designed to connect the Bath Road with the new main south-terminal disembarkation area. This view of the tunnel was taken at the point where it passes under the temporarily closed No. 1 runway. Of reinforced concrete, the tunnel is being built by the open-cut method. The main part of the contract, which is in the hands of Taylor Woodrow, Ltd., will be completed this year.*

## BREVITIES

DELIVERY of B.E.A.'s first *Discovery*-Class Viscount 701 is now expected for October 1st, 1952, and regular passenger services should follow in March 1953. Some *ad hoc* services may be flown during the Christmas holiday rush.

* * *

The last of four B.O.A.C. Constellations modified by Lockheed Aircraft Service for the reduced-fare Mayflower service has been returned to the Corporation. The modifications included the fitting of 68 seats and a number of cabin refinements.

* * *

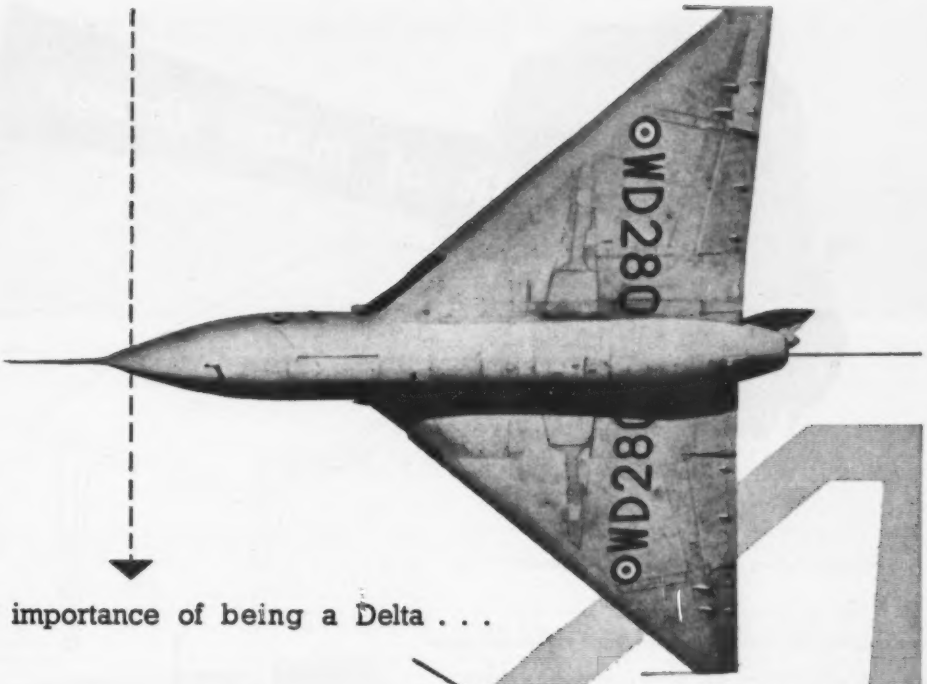
Trans World Airlines have received the 1951 Aviation Safety Award of the National Safety Council for their "contribution to safe air transportation in 1951 by flying 2,540,855,000 passenger miles of routes in the U.S., over the Atlantic, through the British Isles, Europe, North Africa, the Middle East and India."

* * *

In its 24th annual report, the British Travel and Holidays Association states that Britain earned £103m from 695,000 overseas visitors during 1951. Earnings were £15½m more than in 1950, and there were 14 per cent more visitors. The Association feels that this country can become the world's leading tourist area, but that to make it so we must resolutely follow the examples set by France and Switzerland, "whose policy has always been to consider visitors first."

* * *

The recent petition to the C.A.B. by Seaboard and Western Airlines for authorization to operate scheduled all-freight flights on the North Atlantic routes has met with little success. Although President Truman approved the C.A.B. decision to reject the Seaboard application, he ordered that temporary authority be granted by exempting the airline from certain regulations. Under this exemption, Seaboard can make 12 monthly round-trips between the U.S. and Europe, North Africa the Middle East and Far East, but cargo will represent only 40 per cent of payload on these flights.

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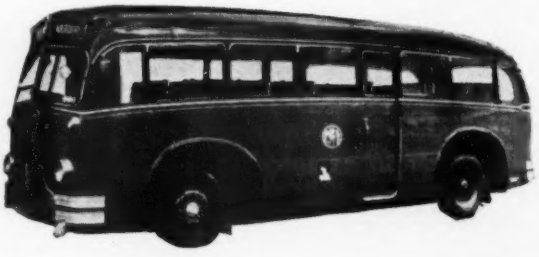

# CELLON

## AIRCRAFT FINISHES

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*PANSHANGER PARTY-GOERS : Two unusual visitors to the recent At Home held at Panshanger were a Hillson Praga (left) and a Hornet Moth. G-AEUT, built in 1937, and powered by a 40-h.p. two-cylinder Praga "B" engine, is now owned by Mr. V. H. Hallam, of Hertford. The Hornet, G-AEET, has recently been rebuilt by Mr. Cooper of the London Aeroplane Club, and is the latest restoration to the Register of British Civil Aircraft.*

# FROM THE CLUBS

ON Saturday, June 21st, the Boston Aero Club held an At Home, which proved successful despite shocking weather. The event was supported by some 600 members of the public, and almost a dozen visiting aircraft braved the rain and low cloud: machines from Leicester, Nottingham, Spalding, Sywell, West Hartlepool and Denham, comprising Austers, a Magister, Ercoupe, Dart Kitten and G.A.L. Cygnet managed to get through.

The programme was carried out with few cancellations, starting at 1400 hr with a formation fly-past by club aircraft, which was followed by a wing-walking demonstration by "Chuck" Thompson of the Apex Group. Other items included a bombing competition, which was won by a club member, Mr. E. C. Pyrah, a demonstration of crop dusting and spraying, and a delayed parachute drop, also by Mr. Thompson.

The Boston Aero Club has been progressing quietly this year and has so far accumulated a total of 250 hr flying on its fleet of two Austers, one Gemini and one Messenger. The rates charged for these machines are £3, £7 and £5 respectively. Forty flying members are at present on the club's register, with another 260 associate members. Two flying instructors are available, and three members have obtained their Private Pilot's Licences this year.

NEWS this week from Scotland is that the Scottish Flying Club have taken delivery of their first new machine, a Magister, with which they intend to resume flying at Renfrew. Rates charged are £2 15s solo and £3 15s dual, and the C.F.I., Eric Bradley, reports great enthusiasm. The club will soon take over a large hangar and offices which, until recently, were occupied by the Air Ministry.

Another Scottish news-item comes from Strathtay Aero Club, (operating at Perth) which has received an unusual and generous gift from founder-member Mr. G. Scott-Pearse. The scheme is that from June 30th every member would have the opportunity of entering a draw, the winner of which—of either sex—will be given a course of flying lessons, extending to 30 hours and thus enabling him or her to obtain a P.P.L. By sponsoring this free course, Mr. Scott-Pearse hopes to encourage the non-flying members of the club and to give a chance to those who can afford to fly only occasionally.

FOR the second time, a Herts and Essex Aero Club members Mr. V. A. Ercolani, has won the Distance Cup in the Fler, Rally, organized by the Aero Club de Basse-Normandie and held during the week-end of June 21st-22nd. Flying his Messenger G-AJKV, Mr. Ercolani made his winning journey from Broxbourne to Flers *via* Bordeaux. Herts and Essex were, incidentally, well represented. Also present were Mr. and Mrs. R. Velten in Autocrat G-AIBM, Mr. N. Browning flying his Messenger G-AKZX, and Mr. L. F. P. Walters in Messenger G-AISL.

An excellent reception was provided at the Town Hall, where Abbé René Amiard was presented with the *Medaille de l'Aeronautique* by Mr. Lucien Boussoutrot, on behalf of the French Secretary of State for Air. Eighty British, French and Belgian pilots sat down to dinner on the Saturday night and a dance was held until 2 a.m.

FROM Mr. Michael Conry comes some interesting news of his flying club—operating from Croydon Airport under the title of the Central Flying Group—which was formed in September, 1949. Through keenness and enthusiasm the group has graduated from operating one borrowed Tiger Moth to full ownership of a Tiger and a B.A. Swallow. Since its inception, some 1,000 hr flying have been logged and six P.P.L.s obtained, with another 12 pupils well on the way to qualifying. Here, it seems, is a club which actually turns members away, for, in the words of its chairman, Mr. Conry, "We have as many as we can cope with, and we have to be very selective as to whom we take." At all events, the 22 members seem quite content to fly for 32s 6d per hour—in addition to maintaining their own aircraft and giving flying instruction in their spare time.

RAIN began to fall at Hilversum on Saturday, June 21st, just as the flying display—held to commemorate the silver jubilee of the Netherlands National Flying School—was due to begin. But despite the 400ft cloud-base, the display went through almost according to plan, the only important cancellations being a demonstration of the Fokker S-14 and a parachute descent by "Dumbo" Willans. Even so, the renowned Sonderman had brought the new jet trainer within view of the crowd (6,000 strong) when he was forced to return to base. Superb displays of formation aerobatics (described by one British visitor as the finest he had ever seen) were given by nine Tiger Moths and six Harvards of the Dutch Flying School, although their performances were at times completely hidden in cloud. Three types of British glider were demonstrated : a Slingsby Sedbergh, which was winch-launched, and an Eon Olympia and Slingsby Prefect, which Tiger Moths lifted to cloud-level.

With the exception of some asymmetric flying by a Beech D-18 S and further Harvard aerobatics, the remainder of the flying programme was completed by British visitors—among them Derek Taylor, who put up a polished aerobatic display with a Chipmunk, G-ALWB. Three representative types of the Vintage Aeroplane Club were also put through their paces—the Avian (Ron Gillman), Cirrus Moth (Pat Fillingham) and Cadet (Denis Stonebanks).

BECAUSE of a low cloud-base, the luncheon patrol which was to have been held on Sunday, June 22nd, by the Southern Aero Club had to be postponed, but the new date has not yet been fixed. Despite the weather, quite a number of machines did manage to get through, but no competition was held for free lunches. The Southern Aero Club is experiencing a very busy season and the Gemini which it now operates is reported to be fully booked by members converting to twin-engined aircraft. The cheaper mid-week rate of £2 15s per hour (Magister, solo) is also proving very popular.

# CORRESPONDENCE

*The Editor of "Flight" does not hold himself responsible for the views expressed by correspondents in these columns; the names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.*

## The Collector's Instinct

I READ with interest Mr. J. V. Campbell-White's letter in your issue of June 13th, wherein he rightly suggests the establishment of a reference centre for historical details of aircraft.

It is very obvious that a large number of interested readers are unaware of the existence of Air Britain, an organization which has been actively fulfilling this function for the last four years. It is an entirely voluntary organization, and thrives upon the natural instincts of enthusiasts to collect and disseminate historical facts.

A most comprehensive "information bureau" is available, covering a wide range of subjects, and is conducted by a number of individuals who have each made a lifelong study of the subject which appeals to them most. In some cases these studies assume almost maniacal proportions, and the resulting files have to be seen to be believed. It is not entirely unknown for aircraft manufacturers to seek information upon their own earlier products!

It would be impossible to list here all the subjects on which information is available; suffice it to say that almost every worthwhile field of aviation has, and is, being subjected to a prodigious amount of research by these seemingly inexhaustible enthusiasts.

Membership of Air Britain is a small and inexpensive formality. Full details may be obtained from the hon. general secretary at 31, First Avenue, London, W.3.

I should like to repeat that this is a voluntary association, and it has no commercial or political axe to grind; our only 'grind' is the enjoyable one of laying bare the facts, and recording them for posterity.

D. K. Fox,
London, W.3. Chairman, Air Britain.

[We congratulate Air Britain's members on their enthusiasm. Our correspondent's reference to studies "assuming almost maniacal proportions" does, however, remind us that, in times such as these, skilful assembly of records of prototypes, registration numbers and times and places at which types of aircraft are seen on the ground and in the air, could provide valuable information to an enemy if the data fell into unauthorized hands. Secret aircraft, or those whose existence may be mentioned, but no more, still have to be moved and flown; but to talk about or record such activities, enthusiasm having surmounted discretion and knowledge of security, is dangerous.—Ed.]

## Seen at Gib.

HAVING been at Gibraltar for something over a year, I have seen a fair variety of aerial activity, and perhaps some notes on the aircraft I have seen will be of interest to your readers.

Civil aircraft having my chief interest, I was particularly pleased to see the Heston Phoenix G-AESV, which flew in from Casablanca late last year. Silver City's Dragonfly G-AEWZ, and their Consul G-AIBF have been here, and another old-stager was Dr. Little's Vega Gull G-AFEA. Gibraltar Airways run a service to Tangier, using three old faithful Dragon Rapides, of which G-AERN is the oldest; G-AGEE had its photograph in your recent Commercial Aviation Number.

Morton's and Olley's have had Doves out here, and de Havilland's much-travelled Dove Mk 5, G-ALBM, was here recently. Rapide G-AKMD, on delivery to Air Madagascar, was forced in by bad weather. Another diversion, this one a little larger, was Argonaut G-ALHS, which found Lisbon closed, just before Christmas. On various charter flights to Gibraltar have been B.O.A.C.'s Constellation G-AHEM, an Aquila Hythe, G-AGKY, several Yorks, and Dakotas—notably YU-ABF, a Yugoslav Airline machine which brought a football team in; and PH-TBM, a K.L.M. aircraft with spares for a B.E.A.C. Viking, of which I have seen every one.

As the terminus of one of the air-trooping contracts, and a staging post for another, Vikings belonging to Huntings, Airwork, and Crewsair are all frequent visitors, and a Bristol 170 of Silver City, G-AHJP, has been in on the way to West Africa.

Two other particular interesting civil aircraft that I have seen were VR-NAI, the W.A.A.C. Marathon, which staged through here at each end of its trials, and ZS-DFT, a South African-owned Aero 45, that very trim little Czech design.

Turning now to military aircraft, two R.C.A.F. Canadair 4s on their way to Italy to help those suffering in the Po Valley floods stick in my memory, but perhaps the most interesting visitor we have had was a Heinkel 70, forced in here a year ago due to shortage of petrol. A remarkable machine, and very beautiful in the air, it was in rather a poor state of repair, not unusual, I understand, in the Spanish Air Force, to which it belongs. Other Spanish military aircraft seen include numerous Ju 52 3/m, and types I would not vouch for (their recognition, I mean), namely Curtiss Cleveland, He 111, Bücker Jungman and an Me 109.

British military aircraft which have appeared here include the last Halifax with the R.A.F., and some of the last operational Lancasters. Training Wellingtons no longer come here, but we expect Marathons in the future. Lincolns, Hastings and Sunderlands all call, and Mosquitoes also. For the Battle of Britain day, the inevitable Meteor 8 and Vampire came out, but otherwise our only jets are American. Grumman Panthers and McDonnell Banshees have been here, and TBMs, Skyraiders and Martin Maulers.

Reconnaissance aircraft we see are P2V-2, 3 and 4 Neptunes, P4M Mercators, Privateer and PBM Mariner. A North American AJ-1 Savage has called in, due to fuel shortage; the engine was u/s.

Apart from the Mariner, a frequent visitor is the SA-16 Albatross, of which the U.S.A.F. has several in Morocco. JD-1 Invaders also call. Of transport aircraft, we see many R4D Dakotas, R5D Skymasters and JRB Expeditors, but the most interesting was a new U.S.N. Super Dakota. It took a noticeably longer run on take-off than its older sisters on each visit here, despite being unladen. It is undoubtedly much faster in the air.

The Royal Navy treats us to views of Sea Fury, Firebrand, Firefly and Barracuda, mostly in an indifferent state of servicing. That about concludes my account—a pretty fair variety, as you will probably agree.

S. M. Todd Webb.
R.A.F., Gibraltar.

## Crumbs from the Military Table

MAY I please be allowed to cavil against the line taken by Sir Harry Garner (in his Wilbur Wright Lecture) and yourselves (in your editorial of May 30th, 1952)?

It surely cannot be for very many years that aircraft carrying troops, war freight or military commanders will be militarily required to go through the sound barrier. In the meantime, it is a matter of considerable surprise to me that neither Comets nor Bristol 175s have been ordered for these purposes.

London, S.W.1. H. Ball Wilson.

[Our correspondent must have misinterpreted the Wilbur Wright lecturer's remarks. The point which Sir Harry Garner made was that, whereas in the past the qualities demanded of long-range bombers and military transports were also the requirements of civil aircraft, the picture was now changing, and civil-aircraft designers could no longer rely on "picking up the crumbs which fell from the rich military man's table." The lecturer did not, we think, imply that military transports were included in the supersonic category.—Ed.]

## Not the First

IN "The Aeronautical Bookshelf" in *Flight* of May 30th, you suggest that Bosworth Monck's *How the Civil Service Works* is the pioneer venture on that subject. But in 1950 Gollancz published T. A. Critchley's *The Civil Service Today* as being the first of its kind.

Bristol, 6. J. T. Pollock Gard.

## FORTHCOMING EVENTS

June 30-July 13. International Gliding Contests, Spain.
July 4-7. Aéro-Club de Belgique: Control-line Models World Championships, Melsbrook, Brussels.
July 5-6. Aéro-Club de Touraine: Wines Rally.
July 5-7. R.Ae.C.: Deauville Rally.
July 6. Aéro-Club d'Auvergne: International Air Meeting.
July 6-13. Ailes Ardennaises: Air Fête.
July 10-14. Wakefield Cup Models Contest, Norrkoping, Sweden.
July 11-12. National Air Races, Newcastle-on-Tyne Municipal Airport.
July 19. Leicestershire Aéro Club: Rally, Leicester East.
July 20-27. Aéro-Club d'Italia: International Air Week, Italy.
July 26. Royal Engineers' Flying Club: Air Day, Rochester.
July 27. R.A.F. Golfing Society: Match v. 2nd T.A.F., Bad Eilsen.
Aug. 2. "Daily Express" Challenge Trophy Race.
Aug. 2-3. "ILSY" Air Display, Ybenburg.
Aug. 3-4. S.M.A.E.: National Model Aircraft Rally. R.N. Air Station, Gosport.
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Aug. 13-17. Nordic A/2 Models Contest, Austria.
Aug. 15. Aéro-Club de Charente Maritime: Laleu and La Rochelle Air Meeting.
Aug. 15. Ailes Montluconnaises: Rally.
Aug. 16. Aéro-Club de Vendée: Sables d'Olonne Rally.
Aug. 16-17. Bembridge and Sandown Aero Club: Rally.
Aug. 23. Coventry Aeroplane Club: Air Day and Siddeley Challenge Trophy Race.
Aug. 23-24. Aéro-Club de Trente: Dolomites Circuit.
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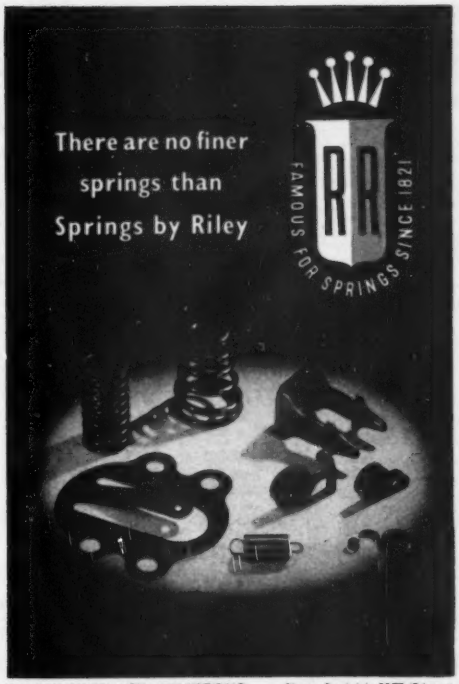


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CAPTAINS required for Viking aircraft based near London. Apply with full details to Chief Pilot, Crewsair, Ltd., 11, Bruton Street, London, W.1. Vacancies also for first officers. [8307]
LICENSED aircraft engineer required. "A" and "C" licences with endorsement for Auster aircraft essential. —Write, stating full details of experience and personal particulars, to Box 0997. [8318]
LICENSED radio engineer and radio mechanics at our base at Stansted Airport, Essex.—Apply, by letter or telephone, to the Senior Radio Engineer, Aviation Traders, Ltd., Southend Airport, Essex. Tel.: Rochford 56491. [0950]
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APPLICATIONS are invited from senior and junior stressmen and draughtsmen for work on new designs. Applications should state age, experience, qualifications and salary expected.—Auster Aircraft, Ltd., Rearsby Aerodrome, Leics. [8308]
WEIGHT estimator required by Percival Aircraft, Ltd., Luton Airport, Beds, for work on fixed wing and helicopter aircraft.—Apply, giving details of age, qualifications, experience and salary required, to: Manager, Ministry of Labour and National Service, Luton, Beds. [0892]


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ASSISTANT chief stressman required by Percival Aircraft, Ltd., Luton Airport, Beds.—Applications, giving full details of qualifications, experience, age and salary required, to the Manager, Ministry of Labour and National Service, Luton. (9988)

TECHNICAL authors and illustrators required by Percival Aircraft, Ltd., Luton Airport, Beds. Knowledge of M.o.S. procedure desirable.—Applications, in writing, stating age, experience and salary required, to Manager, Ministry of Labour and National Service, Luton, Beds. (9994)

TEST laboratory assistants (male) required by Percival Aircraft, Ltd., Luton Airport, Beds. National Certificate standard and previous experience on design of test laboratory equipment desirable.—Applications, stating qualifications, experience, age and salary required, to Manager, Employment Exchange, Luton, Beds. (9996)

AIRWORK GENERAL TRADING Co., Ltd., urgently require "K" licensed electricians for maintenance and overhaul of electrical equipment installed in Hermes and Viking aircraft.—Applications, in writing, to the Service Manager, Airwork General Trading Co., Ltd., Blackbushe Airport, near Camberley, Surrey. (9233)

ESTIMATORS (aircraft, male) required by Percival Aircraft, Ltd., Luton Airport, Beds, fully conversant with general construction and preferably with previous experience in similar capacity.—Applications, in writing, to Manager, Employment Exchange, Luton, Beds, stating age, experience and salary required. (9304)

REQUIRED immediately by Percival Aircraft, Ltd., Luton Airport, Beds, several draughtsmen with comprehensive experience of engine installations and allied systems.—Applications, in writing, stating age, qualifications, experience and salary required, to the Luton Employment Exchange. (9901)

H. M. ROBSON, Ltd., invite applications for positions in the drawing office as follows: designers, detail and modification draughtsmen, checkers, stressmen. The work is concerned with interesting projects connected with fuel metering equipment and hydraulic flying controls for aircraft.—Hobson Works, Fordhouses, Wolverhampton. (9420)

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AIRWORK, Ltd., require staff pilots for duties on Mosquito aircraft at Hurn Airport. No civilian licences necessary.—Applicants, who should have previous R.A.F. or R.N. Mosquito experience apply, Airwork, Ltd., Flying Training Division, Sutton Lane, Langley, Bucks, envelopes to be marked "Flying Training." (9339)

TECHNICAL clerk having served a recognised apprenticeship with Higher National Certificate or equivalent required in gas turbine department, to take charge of all drawing office records and responsible for issuing instructions to works. Good opportunity for progressive type of man willing to accept responsibility.—Applications stating age, experience and qualifications, to Box 1114. (9329)

IMPORTANT Midlands gas-turbine aircraft-engine manufacturer has vacancies for a number of designers and senior and junior draughtsmen. Although experience is most advantageous, it is not necessarily essential as training will be given.—Apply in some detail, please, to Reference F101, Box 0689. (9016)

TECHNICAL publications manager. Applicants should have experience in the preparation of manuals and must also be familiar with A.R.B. and M.o.S. procedure.—Please write, giving full details of experience, to Chief Designer, Dunlop Rubber Co., Ltd., Aviation Division, Foleshill, Coventry. (9362)

SENIOR overhaul fitter to take charge of a testing and inspection department for airborne ancillary equipment. Familiarity with electronic servo-mechanisms and gyroscopic devices essential. Practical flying experience an advantage. Applicants should probably possess a degree or equivalent professional qualification.—Write, Box F.276, at 191, Gresham House, E.C.2. (9225)

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HANDLEY PAGE, Ltd., require a technical assistant of H.N.C. standard to carry out work on thermo-dynamic problems for aircraft air-conditioning and thermal de-icing systems.—Write, stating age and giving particulars of qualifications and experience, to Staff Officer, Handley Page, Ltd., Claremont Road, London, N.W.2. (9210)

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ENGLISH ELECTRIC Co., Ltd., Luton, have vacancies for a technical publications engineer and technical artist. Previous experience is essential.—Please write, giving full details of qualifications and experience and quoting ref. "English Electric 905," to Westminster Employment Exchange, Chadwick Street, London, S.W.1. (9234)

CHIEF stressman. Applications are invited from senior stressmen with experience in pneumatic and hydraulic components. Knowledge of M.o.S. and A.R.B. desirable. Approval system is essential.—Please write, giving full details of qualifications and experience, to Chief Designer, Dunlop Rubber Co., Ltd., Aviation Division, Foleshill, Coventry. (9363)

APPLICATIONS are invited from senior and intermediate design draughtsmen. Experience of aero-engine design desirable, but not essential. Also checkers.—Please write, stating age and giving details of previous experience in chronological order, to the Personnel Officer, The de Havilland Engine Co., Ltd., Stag Lane, Edgware, Middlesex. (9930)


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APPLICATIONS are invited from design draughtsmen and stressmen, also technical assistants with combined design and performance experience for work on both reciprocating and gas turbine aero engines.—Applications should state full particulars of experience and qualifications and should be addressed to the Personnel Officer, The de Havilland Engine Co., Ltd., Stag Lane, Edgware, Middlesex. [8832]

A SSISTANT design engineer for gas turbine thermodynamic design calculation and interested in mechanical and structural side required by large firm in the East Midlands. Preference to applicants having served a recognized apprenticeship or at least the equivalent of a year's works experience. Previous gas turbine experience for applicants below 25 years of age not essential. [8834]

APPLICATIONS stating age, qualifications and experience to Box 1113. [8358]

FLIGHT REFUELLING, Ltd., require a junior assistant in their technical office. Minimum qualification, H.N.C. (Mech); age, 23-25. Interesting programme of test and development work on hydraulic components and systems, and testing of aircraft materials. Salary £450-£550.—Please write, giving full details of age, qualifications, experience and salary required, to Personnel Manager, Tarrant Rushton Airfield, Nr. Blandford, Dorset. [8289]

A TECHNICAL writer is required by a firm of aircraft instrument manufacturers for preparation of installation, maintenance and overhaul manuals and other publications for instrument installations and complete systems. Experience of aircraft installations and electrical equipment is essential. Some previous experience in this type of work would be an advantage. Guildford area.—Write, giving full details of experience, etc., to Box 1067. [8326]

GLOSTER AIRCRAFT CO., LTD., RESEARCH DEPT. A number of vacancies exist in the research department for technicians of degree or H.N.C. standard, for work in connection with flight test instrumentation, the development of fuel systems, cockpit heating and refrigeration systems, etc. It is important that applicants should have had workshop and drawing office experience.—Write, giving full particulars, to the Employment Officer, G.A.C., Ltd., Hucclecote, Glos. [8300]

LARGE Coventry engineering works require Designer Draughtsmen for interesting work on gas turbine aero engine test equipment. The work covers the design and detail of equipment for research, experimental and production projects from initial engine build procedure to component testing and final testing. Salaries commensurate with experience and qualifications of applicants capable of working on own initiative.—Reply in some detail to Reference B1, Box No. 1143. [8305]

ARMSTRONG SIDDELEY MOTORS have a few vacancies for senior and junior stressmen to do work on strength investigation and calculations on gas turbine aero engines. Degree, Higher National Certificate or equivalent essential. This is work of prime national importance. There are also a few vacancies for senior and junior stressmen for work on the installation of gas turbines in aircraft.—Reply in some detail to Reference SJS.2, Armstrong Siddeley Motors, Ltd., Coventry. [8242]

ARMSTRONG SIDDELEY MOTORS, makers of two out of three of England's Super-Priority jet engines, have number vacancies Coventry for experienced planning engineers. Aero engine experience great advantage, general engineering experience possibly sufficient if combined with high level intelligence. Also vacancies for factory layout draughtsmen and senior and intermediate jig and tool draughtsmen.—Reply in detail to reference HDT, Box 1014. [8332]

DE HAVILLAND ENGINE Co., Ltd., have the following technical vacancies available in the Experimental Test Beds Department of their Hatfield factory. Junior technical assistants required for test work in connection with recording and analysing the performance data of development gas turbine engines. Good salaries to suitable applicants. Canteen facilities, five-day week.—Please write, giving age, full details of previous experience and salary required, to the Personnel Officer, The de Havilland Engine Co., Ltd., Hatfield Aerodrome, Hatfield, Herts. [8313]

ENGINEERING appointment. Senior engineer required by light engineering company in London area, to direct development work on ignition equipment for reciprocating and turbine engines. Candidates preferred for this appointment, will be qualified engineers who have had practical experience in the application of such engines, and who can show evidence of ability to control the work of a team. A staff appointment. Pension scheme.—Applicants should write, quoting ref. MBE, giving full particulars of their training and experience, and indicate salary expected to Box 1109. [8350]

ENGLISH ELECTRIC Co., Ltd., Luton, require senior and junior designers, capable of working with a minimum of supervision on design and development of hydraulic components, pneumatic components and aircraft fuel systems. Higher National Certificate or equivalent with practical and drawing office experience essential. Excellent prospects for advancement on a project of the highest priority. Salary £450 to £800, according to age, qualifications and experience. Suitable candidates without the specialized experience stated will be considered as trainees.—Please write, giving full details and quoting Ref. 491C, to Central Personnel Services, 91-93, Gillingham Street, London, S.W.1. [8040]

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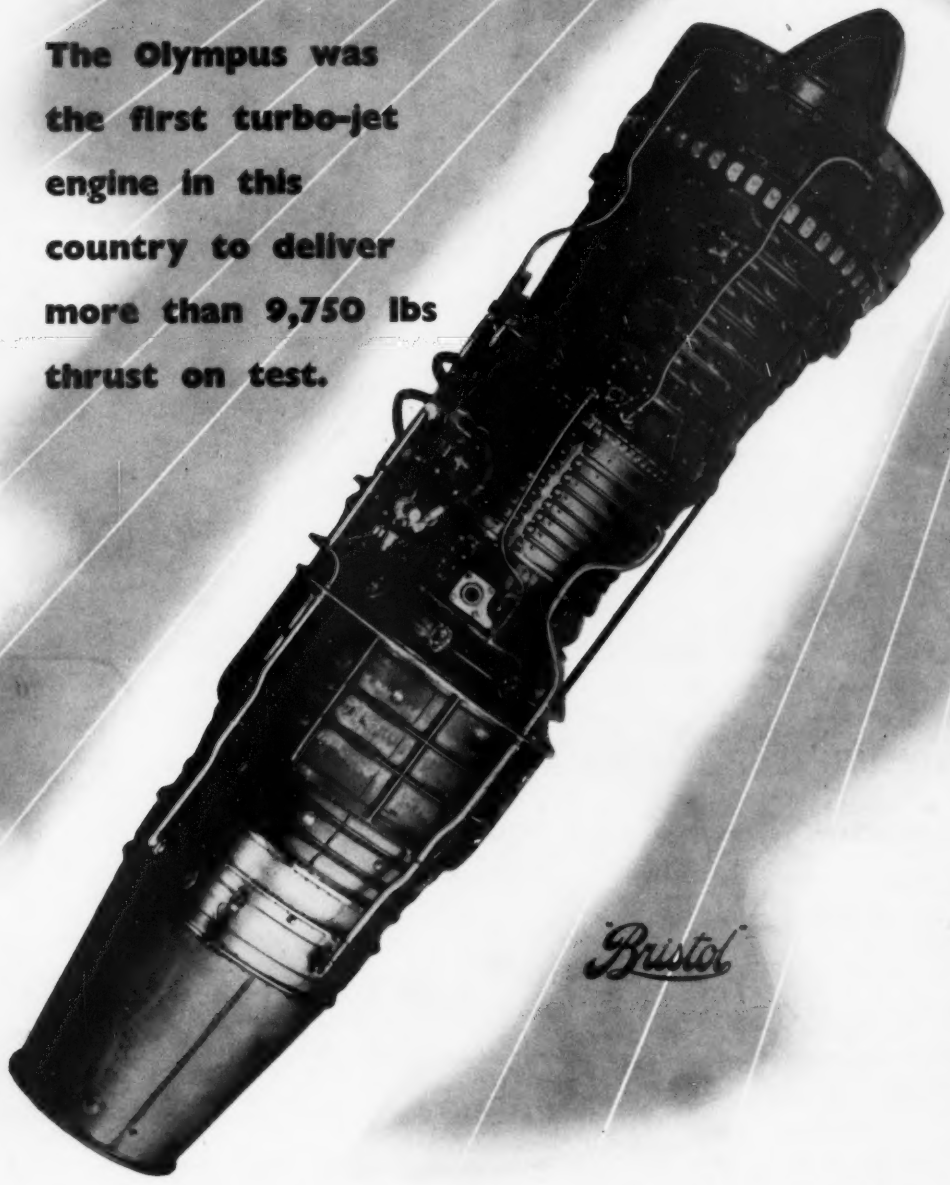

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